NUTRITION SOCIETY OF NIGERIA

13th to 18th September, 2026

# 56TH SCIENTIFIC CONFERENCE & Annual General Meeting

## Book of Proceedings

**Theme:**

# DELIVERING BETTER NUTRITION FOR ALL:

## Connecting The Dots Across Life Cycle, Systems, & Sectors

**CONFERENCE PROCEEDINGS:**
Book of Extended Abstracts

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| **OMV_16** | Perception And Utilization Of Nutrition Information Among Pregnant Women Attending Antenatal Clinics In Abeokuta, Ogun State, Nigeria | Odukoya, P. I.[1] |
| **OMV_18** | Workplace Support, Breastfeeding Practices, And Nutritional Status Of Lactating Mothers In Ibadan, Southwest Nigeria. | Adefi, C.O., |
| **OMV_20** | Dietary Behaviours, Consumption Pattern And Nutritional Status Of Preschool Children In Owo Metropolis | R. A .Mustapha |
| **OMV_21** | Maternal Food Purchasing Behaviour As A Predictor Of Nutritional Status Among Under-Five Children In Egbeda And Ibadan North-East Lgas, Oyo State, Nigeria. | Ibitayo B.B, |
| **OMV_23** | Assessment Of Knowledge And Utilization Of Ante-Natal Care Services Among Primigravida Women Of Child Bearing Age In Angwan Gade Community, Kuje Area Council, Abuja. | Ucheh, B.I, |

## SUB-THEME 2: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages (MV)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **OMV_54** | Evaluation Of Infant And Young Child Feeding Practices Among Mothers Attending Immunization Clinics In Abakaliki Urban, Ebonyi State: A Cross-Sectional Study | Edafioghor L.O., |
| **OMV_55** | Determinants Of Early Initiation Of Breastfeeding Among Lactating Mothers Attending Primary Health Centres In Odogbolu Local Government Area, Ogun State | Oriola, T.H. |
| **OMV_56** | Nutrition Education and Multiple Micronutrient Supplementation Effect on Maternal and Birth Outcomes in Pregnant Adolescents: A Quasi-Experimental Study in Bauchi State, Nigeria | Ajayi, K., |
| **OMV_64** | Breastfeeding Knowledge And Practices Among Mothers Attending Public Health Facilities In Umuahia North Local Government Area, Abia State | Dike, C.C |
| **OMV_65** | Household Food Insecurity, Dietary Diversity and Nutritional Status among Mother–Child Dyads in North-Central Nigeria | Omachi, B.A. |
| **OMV_66** | Knowledge And Practice Of Infant Feeding Among Mothers Exposed To Health Education Messages In Nutrition In The Immunization Clinic Of Comprehensive Kofar Kaura Katsina | Garba, H. |
| **OMV_67** | Effect of MIYCN Training for Frontline Health Workers on Dietary Diversity and Nutritional Status of Children Aged 6–59 Months in Kaduna State, Nigeri | Shanu A.L., |
| **OMV_69** | Artificial Intelligence in Maternal and Child Nutrition: A Narrative Review of Applications, Evidence Gaps, and Implications for Low- and Middle-Income Countries | Nnedu, C.V. |
| **OMV_70** | Traditional Beliefs versus Health Worker Recommendations: A Qualitative Exploration of Persistent Misconceptions About Breastfeeding and Complementary Feeding Among Nursing Mothers in South Senatorial District, Niger State, Nigeria | Oladejo, E. O., |
| **OMV_71** | Breastfeeding Knowledge and Intent Among Pregnant Women Attending Antenatal Clinics in Selected Primary Healthcare Centres in Ibadan | Adefisayo, K.A. |
| **OMV_72** | Effect Of Nutrition Education Intervention On Dietary Diversity Among Pregnant Women In Federal Capital Territory Abuja | Ezema, V.U, |
| **OMV_73** | Food Security, Dietary Diversity and Nutritional Status of Pregnant women in Ekiti State | Dada, I.O., |
| **OMV_76** | Replacing Monetary Incentives with Food Baskets: Lessons from the Enhancing Intergenerational Health in Nigeria: Peripartum as Critical Life Stage for Cardiovascular Health (ENHANCE-CVH) Study | Ezema, V.U., |

## SUB-THEME 2: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages (MV)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
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| **OMV_01** | Assessment Of Nutritional Status, Food Consumption Pattern And Polycystic Ovarian Syndrome (Pcos) Among Patients Attending Gynecology Clinic In Abeokuta, Ogun State, Nigeria | Ilori O.A |
| **OMV_02** | Growth Velocity Of Children (0-18 Months) And Maternal Feeding Rituals In Ekiti State, Nigeria | Akintomide T.H |
| **OMV_04** | Maternal Nutritional Knowledge, Food Security, And Anthropometric Status As Determinants Of Child Malnutrition: A Cross-Sectional Analysis In Abakaliki Local Government Area, Ebonyi State, Nigeria. | Akinade E. Ogunniyi |
| **OMV_05** | Nutrition-Knowledge, Dietary-Practices And Nutrition-Status Of Pregnant Women Attending Antenatal Care At Selected Primary Healthcare Centers In Ekiti State | E. O. Adaramola |
| **OMV_06** | Morbidity Patterns And Socioeconomic Determinants Of Child Malnutrition Among Children Aged 6–23 Months In Nigeria: Evidence From Pooled NDHS Data 2003–2024 | Sulaiman, S |
| **OMV_07** | Maternal Nutrition Behaviour And Nutritional Status Of Lactating Mothers In Four Rural Communities Of Bauchi State, Nigeria: A Comparative Cross-Sectional Study | Adebusoye, Michael. Sunday |
| **OMV_08** | Assessing The Influence Of Maternal Lifestyle Behaviours On Pregnancy Outcomes In Selected Secondary Health Facilities In Abeokuta South Local Government Area, Ogun State | Akinbule, Oluwafunke O. |
| **OMV_09** | Anthropometry Assessment Of Exclusively And Non-Exclusively Breastfed Babies 0-6 Months In Umuahia North. | Onuoha, A. M. |
| **OMV_10** | Food Taboos, Myths And Nutritional Knowledge Influencing Dietary Patterns Of Pregnant Women In Ile -Ife | Oseni-Ogundipe, R.I |
| **OMV_12** | Dietary Patterns, Feeding Practices, And Developmental Milestone Attainment Among Infants (0-12months) Attending Infant Welfare Clinics In Ogun State, Nigeria | Oluwole, B.O., |
| **OMV_13** | Anthropometric Status, Dietary Diversity, And Infant Welfare Clinic Utilisation Among Infants (0-12 Months) In Ogun State, Nigeria. | Oluwole, B.O, |
| **OMV_14** | Association Between Socio-Demographic Factors And Nutritional Outcomes Among Children Aged 6–59 Months Attending Ungwan Rimi Primary Health Care, Kaduna State, Nigeria. | Kure, T.S. |
| **OMV_16** | Perception And Utilization Of Nutrition Information Among Pregnant Women Attending Antenatal Clinics In Abeokuta, Ogun State, Nigeria | Odukoya, P. I.[1] |
| **OMV_18** | Workplace Support, Breastfeeding Practices, And Nutritional Status Of Lactating Mothers In Ibadan, Southwest Nigeria. | Adefi, C.O., |
| **OMV_20** | Dietary Behaviours, Consumption Pattern And Nutritional Status Of Preschool Children In Owo Metropolis | R. A .Mustapha |
| **OMV_21** | Maternal Food Purchasing Behaviour As A Predictor Of Nutritional Status Among Under-Five Children In Egbeda And Ibadan North-East Lgas, Oyo State, Nigeria. | Ibitayo B.B, |
| **OMV_23** | Assessment Of Knowledge And Utilization Of Ante-Natal Care Services Among Primigravida Women Of Child Bearing Age In Angwan Gade Community, Kuje Area Council, Abuja. | Ucheh, B.I, |

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| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **PMV_11** | Assessment of Nutritional Knowledge among Pregnant Women in Ekiti State, Nigeria. | Amoke, R.I. |
| **PMV_15** | Assessment of Knowledge, Skills and Perception of Frontline Workers toward the implementation of Micronutrient Powder (MNP) in Adamawa and Kano States, Nigeria. | Ahmad, N.P. |
| **PMV_17** | Assessment of Maternal Socioeconomic Status and Anthropometric Indices of Under-Five Children attending selected Primary Health Centres in Ogbomoso North, Oyo State, Nigeria. | Deniran, I.A., |
| **PMV_19** | Assessment Of Mother's Knowledge And Practice On Infant Feeding And Weaning At Dawakin Tofa General Hospital, Kano State. | Sadi, N. S. |
| **PMV_22** | Assessment of Micronutrient Deficiencies among Women of Reproductive age in Selected Urban and Rural Areas of Birnin Kebbi LGA, Nigeria | Yusuf, A.B. |
| **PMV_24** | Development and Validation of Nutrition Education Tools on Dietary Management of Osteoporosis among Elderly | Ozibe G.T., |
| **PMV_25** | Maternal Depression and Responsive Feeding Practices among Mothers Of Infants Attending Primary Health Care Centres in Ibadan North-West, Nigeria | Awoleye, C. Y. |
| **PMV_27** | Influence of MUAC and Parity on Proximate and Mineral Composition of Colostrum of Mothers in Zaria Kaduna State | Muhammad A |
| **PMV_30** | Impact of Maternal, Infant and Young Child Nutrition (MIYCN) Training on Health Worker Performance, Nutrition Indicators, and Vitamin A Status in Kaduna State, Nigeria: A Quasi-Experimental Evaluation | Mbochi, A.L.C. |
| **PMV_33** | Impact of Maternal, Infant and Young Child Nutrition (MIYCN) Training on Health Worker Performance, Maternal Dietary Intake, and Nutritional Status in Kaduna State, Nigeria | Aliyu S.T. |
| **PMV_39** | Double Burden of Malnutrition among School-aged Children in Southwest Nigerian: State-Level Variation and Factors using Modified Composite Index of Anthropometric Failure (mCIAF) | Wahab, N.O. |
| **PMV_40** | Creating an Enabling Environment for Optimal Breastfeeding among Teenage Mothers in Low- and Middle-Income Countries: A Narrative Review | Oyebanji, O.J. |
| **PMV_42** | Nutritional Status, Micronutrient Supplementation Compliance and Associated Factors among Pregnant Women attending Primary Healthcare Centres in selected LGAs within Southwest Nigeria | Abimbola A.O. |
| **PMV_43** | Diet Quality of Pregnant Women in Selected Hospitals in Ogbomoso, Oyo State | Oroniran O.O |
| **PMV_45** | Influence of Maternal Characteristics on Exclusive Breastfeeding Practices Among Mothers Attending Child Welfare Clinics in Odeda L.G.A., Ogun State, Nigeria | Tijani, O.N. |
| **PMV_47** | Assessment of Perception of Cultural Practices in Relation to Nutritional Status of Under-five Children in Akinyele Local Government Area, Ibadan, Oyo State | Akinsanmi, O.A. |

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| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **PMV_49** | Improvements in Breastfeeding Practices Have Not Been Matched by Comparable Progress in Complementary Feeding Indicators in Nigeria | Idowu, O.A. |
| **PMV_50** | Nutritional Status, Feeding Pattern And Types Of Complementary Foods Of Infants Aged 6-24 Months In Ogbomoso North Local Government Area, Oyo State, Nigeria. | Alabi, O.D. |
| **PMV_57** | Diet Quality Among Women Of Reproductive Age In Selected Urban Communities In Abia State, Nigeria | Okonkwo, E.M, |
| **PMV_58** | Household Iodized Salt Use and Nutritional Status of Women of Reproductive Age and Under-Five Children in Akpabuyo, Nigeria | EKPO, A.I., |
| **PMV_60** | Household Water Security and Food Safety Practices of Adults in Selected Urban Slums in Ibadan North East Local Government Area, Oyo State | Ajayi, F.D., |
| **PMV_61** | Development of lessons and tools for the nutrition education of mothers in Nsukka rural community; Enugu State, on infant feeding practices. | Edeh, R.I. |
| **PMV_62** | Maternal weekly food group consumption and body composition of pregnant women (18 – 45 years) attending antenatal clinic at the Federal Medical Centre (FMC), Umuahia | Ikpemo, K.O., |
| **PMV_63** | Fruit preferences and knowledge of fruit consumption benefit among School-aged Children in Owerri: A Baseline Assessment | Ezenwa, C.J. |
| **PMV_74** | Nutritional Status of Under-Five Children and their Household Dietary Pattern inOwo Local Government, Ondo State, Nigeria | Olanrewaju, O. |
| **PMV_75** | Impact of Maternal Education on Child Health Card Utilization, Growth Monitoring and Promotion, and Child Growth Trajectories Among Under-Two Children in Abeokuta, Nigeria | Akinbule, O.O., |
| **PMV_77** | Food Security And Complementary Foods Quality Within Households Of Infants And Young Children (6-23 Months) In Babban Dodo Community, Zaria Lga, Kaduna State | Agboola, F. O., |

## SUB-THEME 3: Harnessing the Potential of the Private Sector in Ending Malnutrition in All Its Forms (HP)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **OHP_02** | The Role of the of the Private Sector in Ending Malnutrition in All Its Forms: Opportunities, Contributions and Challenges | Ali, A.I. |
| **OHP_04** | Potentials of Private Sector Initiatives towards Achieving Food Security: A Study of Peace Agro-Innovate Ventures in Imo State | Okwulehie, F.C., |
| **OHP_05** | Harnessing The Potential Of Nutrition Education And Mobile Phone Intervention In Improving Maternal Iron Status Of Pregnant Women In Abeokuta Metropolis | Ifebajo, A.Y, |
| **PHP_03** | Food Safety Knowledge and Practice Among Food Handlers in Restaurants in Nsukka Town, Enugu State, Nigeria | Okafor, A.M. |

## SUB-THEME 4: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage (AN)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **OAN_01** | Anthropometric Characteristics, Perceived Health Status, and Prostate Cancer Risk Factors among Male Artisans in Ogun State, Nigeria | Ilori O.A |
| **OAN_03** | Beyond BMI: Cardiovascular Risk And Dietary Inequalities Among In-School Adolescents In Osogbo, Southwestern Nigeria | Oyewo, I.O. |
| **OAN_08** | Comparative analysis of phytochemical and antioxidant potential of some commonly consumed herbs (clove, black seed and doum palm) among university students within Kaduna state, Nigeria | Abbas Olagunju |
| **OAN_09** | Dietary Intake and Nutritional Status of Secondary School Adolescents in Southwest Nigeria | Omotoye F.E., |
| **OAN_10** | Comparative Study of the Nutritional Status and Diet Quality of Adolescents in Selected Government-owned and Private Boarding Schools in Ogun State. | Enidunni, S.A., |
| **OAN_12** | Obesity, Weight Loss Intention and Food Consumption Pattern among Female Undergraduate Students in Ondo State, Nigeria | Olotu, O.B., |
| **OAN_14** | Awareness, Knowledge, and Practice of Folic Acid Supplementation among Women of Childbearing Age in Kubwa District Area of FCT Using the Socio-Ecological Model | Oyelowo A.O |
| **OAN_15** | Assessment of Indices of Renal Function in Undergraduates with Normal and Elevated Blood Pressures in a Nigerian University | Ajayi, O.O |
| **OAN_16** | Development and Testing a School-Based Nutrition Education Intervention Among Female Adolescents in Kano State, Nigeria: Findings from a Feasibility Study | Abubakar, H.A |
| **OAN_19** | Nutritional Knowledge, Dietary Practices and Consumption Pattern of Fruits and Vegetables among In-School Adolescents in LAUTECH International College, Ogbomoso, Oyo State, Nigeria. | Deniran, I.A., |
| **OAN_20** | Determinants of dietary adequacy and diet quality of in-school adolescent girls in Nigeria: Implications for non-communicable diseases. | Alagbo, P.K. |
| **OAN_21** | Eating patterns and micronutrient intake among self- and non-self-catering female undergraduates living in residential halls | Umeakuka, C.C, |
| **OAN_22** | Association between beverage consumption patterns and cardiovascular diseases risk factors among undergraduate students in Abeokuta. | Ilesanmi, M.A |
| **OAN_23** | Effect of a Health Belief Model– based Intervention on Diet Quality, Nutrition Knowledge, and Dietary Behaviour Among In-School Adolescents in Ogun, Nigeria | Ademiluyi, D. D |
| **OAN_25** | Influence of Food Marketing Strategies and Nutrition Label Awareness on Dietary Choices Among Adult Shoppers in Some Selected Kano Malls | Kurawa, M.S. |
| **OAN_26** | Prevalence and Risk Factors of Undernutrition Among School-Age Children in Umuahia North Local Government Area, Abia State, Nigeria | Nwonye, O |

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| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **OAN_27** | Knowledge, Attitude and Consumption Practices of Fruits and Vegetables among Male Adolescents in Selected Secondary Schools in Ibadan, Oyo State, Nigeria | Olaniran, O.P |
| **OAN_28** | Design and Evaluation of a School-Based Intervention on Cooking Literacy, Nutrition Knowledge and Ultra-Processed Food (UPF) Consumption among In-School Adolescents in Ibadan | Raphael, V.A. |
| **OAN_31** | Cost and Affordability of Healthy Diets among Undergraduate Students in a private University, Ogun State | Akinsanya, O.B., |
| **OAN_33** | Effect of enhanced cooking method of pigeon pea on iron status of adolescent girls in Nsukka, Enugu State. | Okafor, I.G. |
| **OAN_35** | Consumption Patterns and Nutritional Status of Undergraduate Students in Abeokuta, Ogun State, Nigeria | Lam, F.J., |
| **OAN_37** | Impact Of Nutrition Education On Nutrition Knowledge Among Adolescents In Umuahia Metropolis, Abia State, Nigeria | Chijioke, D.S |
| **OAN_40** | Development and Validation of Culturally Appropriate Calcium Nutrition Education Tools for Adolescents and Young Adults in Ibadan, Nigeria | Shonibare, P.O. |
| **OAN_42** | Body Image Perception and Dietary Pattern of Secondary School Students in Ikorodu, Lagos State | Olutunde, B.A. |
| **OAN_43** | Fruit and Vegetable Consumption and Associated Factors among In-School Adolescents in Ibadan, Nigeria: Implications for Promoting Adolescent Nutrition | Jesuyemi, G.P., |
| **OAN_44** | Dietary Pattern and Nutritional Status of Secondary School Students in Ogbomoso North. Oyo State | Adeyemo, G.A., |
| **OAN_45** | Assessment of Food Purchasing Patterns and Nutritional Status among Adolescents in Federal Polytechnic Ilaro, Ogun State, Nigeria | Adewunmi, H.O., |
| **OAN_46** | Evaluation of the Prevalence of Obesogenic Risk Factors and Nutritional Status of Young Adults in Ota State Hospital, Ogun State, Nigeri | Olutayo, K.O, |
| **OAN_47** | Diet Quality and Knowledge Regarding Breast Cancer Among Female Undergraduates in Ladoke Akintola University of Technology, Ogbomosho. | Akinremi, T.I, |
| **OAN_48** | Nutritional and Health Challenges Among Adolescents in Imo State: Risk Factors and Opportunities for Sustainable Development | Okwulehie, F.C., |
| **OAN_49** | Water Stress Information And Water Consumption Pattern Among Students Of Moshood Abiola Polytechnic, Abeokuta And Federal Polytechnic, Ilaro, Ogun State, Nigeria | Lam, F.J., |
| **OAN_50** | Nutritional Status and Dietary Characteristics of Female Adolescents in Cross River State, Nigeria. | Otu, K.A., |
| **OAN_51** | Food Purchasing Behaviour and Dietary Diversity among In-School Adolescents in Oluyole Local Government Area, Ibadan, Nigeria | Ifeoluwa, O.B. |
| **OAN_52** | Dietary Quality Indicators And Cardio-Metabolic Risk Status Of Adolescents Attending Public And Private Secondary Schools In Ibadan Metropolis, Nigeria | Funmilayo, E.O. |
| **OAN_53** | Association between Dietary Patterns, Overweight and Menstrual Disorders among Female Undergraduates in a Tertiary Institution in Southwest Nigeria | Samuel, J.O., |

## SUB-THEME 5: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage (AN)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **PAN_04** | Assessment of Nutritional Status, Food Consumption Pattern and Short Chain Fatty Acids among Adolescent School Girls in Igabi LGA, Kaduna State | Abdullahi Haruna |
| **PAN_05** | Nutrition and Health Risk Behaviours among Adolescents in Secondary Schools of Katsina State, Nigeria: Implications for Lifelong Health Outcomes | Tukur, M.J |
| **PAN_06** | Ultra-Processed Food Consumption and Emotional Regulation Difficulties Among Adolescents: A Scoping Review | Akinade E.O.,i |
| **PAN_07** | Adolescent Nutrition and Health in the 21st Century: Challenges, Determinants, and Intervention Opportunities | Ali A.I., |
| **PAN_11** | Assessment of Adolescents' Nutrition Knowledge and Perception of old age in Ogun State, Nigeria | Adewale I.O. |
| **PAN_13** | Food Accessibility and Prevalence of Highly Processed Food Intake Among In-school Adolescents in Sabon Gari LGA, Kaduna State | Waziri, AA., |
| **PAN_17** | The Reality Of Adolescent Food Environments Around The World: In Our Own Word | Jayeola T., |
| **PAN_18** | Household characteristics, Nutritional knowledge and Food Choices of In-School Adolescents in Ondo West Local Government Area, Ondo, Nigeria. | Oluwadamilare, P.A |
| **PAN_24** | Food Choices, Nutritional Status and Depressive Disorder among Adolescents Attending Government Secondary Schools in Abeokuta Metropolis, Ogun State. | Olatunji T.J., |
| **PAN_29** | Unhealthy Dietary Patterns and Knowledge of Dietary Risk Factors for Type 2 Diabetes Mellitus Among Adolescents and Young Adults in Southwest Nigeria | Tubi-Nwangwu, I., |
| **PAN_30** | Prevalence and Determinants of Acute and Chronic Malnutrition among Children Aged 6-59 Months in Calabar South Local Government Area, Cross River State, Nigeria | Idonije-Ushie, C.O. |
| **PAN_32** | Assessing Knowledge of Ultra-processed Foods and Anthropometric Status on Adolescent Aged 10-19 Years in Ibadan Southwest Local Government, Ibadan, Oyo State. | Abiola M.F, |
| **PAN_34** | Association between Dietary Patterns and Mental Health among Nigerian University Students | Ani, P. N, |
| **PAN_36** | Effect of a Combined Nutrition Education and WASH Intervention on Nutrition Knowledge of School-going Adolescents in Nigeria: A Comparative Baseline–Endline Study | Sopuru J.C., |
| **PAN_38** | Socioeconomic Status of Parent, Dietary Pattern and Mental Health Outcomes of In-School Adolescents in Selected Local Government Areas in Ogun State | Sokunbi-Seyi, P.O. |
| **PAN_39** | Dietary Pattern And Anthropometric Characteristics Of Adolescents In Abeokuta North Local Government, Ogun State | Adewunmi A. S.1, |
| **PAN_41** | Evaluating The Impact Of Dietary Patterns On Obesity Among School-Age Children In Educational District V, Lagos State | Lano'Maduagu, A.T., |
| **PAN_54** | Association between Nutritional Knowledge and Nutritional Status of Out-of-school Adolescents in Makurdi, Benue State | Gwadza P.M, |

## SUB-THEME 5: Precision Nutrition and Nutrients: Making the Promise a Reality (PN)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **OPN_08** | Preparation and Evaluation of a Non-Dairy Yoghurt Fortified with Chia Seed | Adekolujo, O.B |
| **OPN_10** | Impact Of Plant Bio Active Compounds On Human Nutrition And Health (Using Sida Acuta To Cure Hypertension In Wistar Rats) | Akinola O.O, |
| **OPN_11** | Nutraceutical Potential of Curcuma longa and Piper nigrum: Synergistic Modulation of Oxidative Stress in an Indomethacin-Induced Gastric Ulcer Model | Okechukwu, E.M., |
| **OPN_13** | Effects Of Dietary Baobab (*Adansonia Digitata L.*) Leaf Supplementation On Serum Cea, Oxidative Stress And Haematological Indices In Mnu-Exposed Wistar Rats | Muhammad, A. |
| **OPN_14** | Preclinical Trial of Avocado Pulp supplementation in an L-NAME Model of Cardiovascular Injury | Amadi, J.A.C. |
| **OPN_17** | Proximate Composition and Antioxidant Activity of Whole Wheat Bread, Pure Wheat Bread and African Locust Bean (Parkia biglobosa) Composite Wheat Bread | Oseki, O.P., |
| **OPN_18** | Qualitative and Quantitative Phytochemical Contents of Whole Wheat Bread, Pure Wheat Bread and African Locust Bean (Parkia biglobosa) Composite Wheat Bread | Oseki, O.P., |
| **OPN_21** | Evaluation of the mineral, physical and chemical properties of enteral tube feeds administered in Jos University Teaching Hospital, Jos, Plateau State. Nigeria. | Akuirene, J.O., |
| **PPN_01** | Association of Angiotensin Converting Enzyme Gene Polymorphism Among Overweight Hypertensive Patients Attending Murtala Muhammad Specialist Hospital, Kano State, Nigeria | Muhammad, A.G., |
| **PPN_02** | Contribution of Carotenoids and Retinoids to Vitamin A Intake in Nigeria. | Afolami, J.I. |
| **PPN_03** | Assessment Of Salt And Sugar Intakes And Their Association With Hypertension And Diabetes Mellitus Among Adults In Makarfi Town, Makarfi Lga, Kaduna State, Nigeria | Agboola, F.O. |
| **PPN_05** | Assessment of Dietary Diversity and Nutrient Intake among School-aged Children in Calabar Metropolis. | Adesuyan, A.J., |
| **PPN_06** | Effects of Processing Methods on the Nutritional Quality and Microbial Safety of Fresh and Damaged Tomatoes for Precision Nutrition | Ani, O.N. |
| **PPN_07** | Prevalence Of Iodine Deficiency Among Adults (40yrs-70yrs) In Umuahia North LGA of Abia State. | Agomoh-Adeoye, Q.C., |
| **PPN_09** | Glucose-Lowering Effects of Cinnamomum verum, Xylopia aethiopica, and Piper nigrum: A Structured Narrative Review | Chukwunwogor, E.S. |
| **PPN_12** | Measurement Errors And Mitigation Strategies In Dietary Assessment: A Critical Review | Oche, P.I., |
| **PPN_19** | Development and adaptation of food consumption for nutritional research in Nigeria: A review | Oche, P.I., |
| **PPN_22** | Sensory Evaluation and Nutrient Composition of Biscuit Produced from Composite flour of Yellow maize (Zea mays) and Coconut (Cocos nucifera) | Akuirene, J.O., |
| **PPN_23** | Comparative Analysis between the Expected and Actual Energy and Nutrients Content of Blenderized-Formulated Tube Feeds Administered in Lagos University Teaching Hospital, Lagos, Nigeria. | Akuirene, J.O., |

## SUB-THEME 6: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery (IC)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **OIC_01** | Health Seeking Behavior and Metabolic Risk Factors Among Staff of University of Nigeria, Nsukka, Enugu State | Anoshirike, C.O. |
| **OIC_02** | A Low-Glycemic Alternative For Clinical Nutrition: The Potential Of Germinated Pigeon Pea And Cocoyam Cookies For Postprandial Glycemic Control | Omolade E.O |
| **OIC_05** | Effect of After-Meal Consumption of Soft Drinks on the Glycemic Index and Glycemic Load of fried rice. | Salawudeen, S. O |
| **OIC_07** | Iron Status and Dietary Habit of School-age Children in Selected Primary Schools in Afikpo, Ebonyi State, Nigeria | Agwo, E.O. |
| **OIC_08** | Modulation of the Insulin-Leptin Signaling Axis and Nrf2 Antioxidant Pathway by Zinc and Vitamin C Co-administration in Obese Models. | Onuoha, A. M |
| **OIC_10** | Effect of Nutritional Counselling and Dietary Intervention on Nutritional Status, Antioxidant Vitamins and Oxidative Stress Biomarkers among Tuberculosis Patients Attending Infectious Diseases Hospital Kano, Nigeria | Salman, J.Y. |
| **OIC_12** | Knowledge of Menopause and Nutrition Education Practices among Health Practitioners: Implications for Evidence-Based Women's Health Promotion in Kaduna State, Nigeria | Aliyu, S.T., |
| **OIC_13** | Effectiveness of a Community-Based Nutrition Education Intervention on Blood Pressure, Body Fat, Muscle Mass, and Visceral Fat among adults with High Blood Pressure in low-resource Communities. | Benneth I. C |
| **OIC_14** | Prevalence and Factors Associated with Hypocalcemia Among Pregnant Women in Jahun, Jigawa State, Nigeria | Nafisa, A.A |
| **OIC_16** | Estimated Daily Intake (EDI) and Target Hazard Quotient (THQ) of Non-Toxic and Toxic Mineral Elements in Baby Foods Sold in Gwale Local Government, Kano | Alhaasan, A.J |
| **OIC_17** | Diabetes Self-Care Management Practices And Knowledge Of Type 2 Diabetes Outpatients In Federal Medical Centre, Abeokuta | Odebunmi, S.S., |
| **OIC_18** | Assessment of Nutritional Status and Diet Quality of Type 2 Diabetes Out-Patients Attending State Hospital, Ijaye, Abeokuta | Olaniyan, S.S |
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| **OIC_23** | Relationship between Nutritional status and Blood pressure of apparently healthy primary school pupils in Zaria Local Government Area of Kaduna state | Suleiman Ubangida, |
| **OIC_25** | In Vitro and Ex Vivo Evaluation of the Antidiabetic and Antioxidant Potentials of Cissus populnea (Okoho) Stem and Bark Extracts | Aloysius, M.T. |
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## SUB-THEME 6: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery (IC)

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|---|---|---|
| **OIC_32** | Assessing Perceived Barriers To Seeking Nutrition Help Among Young Adults With Eye Defect (Refractive Error) In Ibadan, Oyo State: Focus On Ibadan North And Lagelu Local Government Area | Adedeji, S.A. |
| **OIC_33** | Nutritional Status And Prevalence Of Metabolic Syndrome Among Outpatients In Federal Medical Centre, Abeokuta. | Adebayo,Y.O |
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| **OIC_44** | Dietary Adherence And Attitudes Towards Nutrition Teleconsultation Among Adults With Type 2 Diabetes Mellitus In Ekiti State, Nigeria | Olowolafe, B.O. |
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| **OIC_52** | Pneumococcal Conjugate Vaccine Uptake And Nutritional Status Among Under-Five Children Attending Aminu Kano Teaching Hospital, Kano State, Nigeria: A Cross-Sectional Study | Muhammad, M.M, |
| **OIC_55** | Integrating The Use Of Food Composition Tables/Databases In Determining Post-Prandial Blood Glucose Response To Under-Utilized Cocoyam (Xanthosoma Mafaffa)-Based Traditional Diets | Udenta, E. A., |

## SUB-THEME 6: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery (IC)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
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| **PIC_03** | Dietary Patterns, Nutritional Adequacy And Nutrition Intervention At First Antenatal Registration: A Five-Year Retrospective Analysis At Lagos Island Maternity Hospital (2019–2023) | Ijiwola F.W |
| **PIC_04** | Comparative In Vitro and Ex Vivo Evaluation of the Antidiabetic and Antioxidant Potentials of Abelmoschus esculentus (Okra) Leaf, Pod, and Seed Extracts | Aloysius, M.T., |
| **PIC_06** | Nutritional Components and Stability Studies of Two Locally Formulated Anti Sickling Nutraceuticals: Sicklo-N100 And Sicklo-N200 | Abdulazeez, B. O. |
| **PIC_09** | Relationship between Glycaemic Control and Micronutrient Status in Individuals with Type 2 Diabetes Mellitus. | Onuoha, A. M |
| **PIC_11** | Anti-Hyperuricemic And Antioxidant Potential Of Hunteria Umbellata Seeds In Pyrazinamide Induced Hyperuricemia In Rats. | Ugbenyen, A.M. |
| **PIC_15** | Nutritional Profile, Phytochemical Composition, and In Vitro Anticancer Potential of Wild Chenopodium album Leaves; Implications for Functional Food Development. | Adamu, Y.M |
| **PIC_24** | Barriers And Motivators to Caregiver Adherence to Nutrition Interventions for Children in Selected Tertiary Hospitals in Southwest Nigeria: Dietitians' Perspective | George, O.M. |
| **PIC_29** | Impact of Delayed Healthcare-Seeking Behavior and development of a context-specific decision-support framework linking caregiver, household, community and health-system factors to strengthen IMAM programme implementation among Caregivers of Children 6-59 Months with Severe Acute Malnutrition (SAM) Attending 164 Integrated Management of Acute Malnutrition (IMAM) Centres in Kaduna State, Nigeria | Muhammad, T. |
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| **PIC_38** | Nutrition and Health Status of People Living with HIV in Oron LGA of Akwa Ibom State | Udoiwod, J.D |
| **PIC_39** | Nutrition Knowledge, Dietary Patterns and Anthropometric Status Among Adult Patients Attending the Federal University Teaching Hospital, Owerri, Imo State | Ukwujiagu,C.U. |
| **PIC_42** | Aligning Evidence-Based Nutrition Protocols with Student Health Service Delivery: Insights from Weight Management and Body Image Practices Among University Undergraduates. | Alagbo P.K., |
| **PIC_51** | Sensory Evaluation and Proximate Composition of Zobo, Ginger, and Clove-Infused Functional Foods: Implications for Dietary Intervention in Chronic Disease Management | Olukogbe, O.O.1, |
| **PIC_54** | Effects of the Consumption of Bush Mango (Irvingia gabonesis) on Obesity and its Hyperglycaemic Complications. | Edeh, R.I |
| **PIC_56** | Full-Course Upfront Distribution as the Key Lever for MMS Adherence in Pregnancy: Lessons from Evidence Action's Operational Feasibility Pilot Study in Nigeria | Edeh, M |
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## SUB-THEME 7: Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade) (FI)

| ABSTRACT ID | ABSTRACT TITLE | AUTHORS |
|---|---|---|
| **OFI_01** | Production And Nutritional Evaluation Of Instant Kunun Alkama (Wheat) Flour Mix Fortified With Groundnut And Date Palm Fruit | Maude, M.M |
| **OFI_04** | Policy Implications and Successes of Infant and Young Child Feeding Practices in Southwest Nigeria: A Systematic Review | Adekanmbi, T.E. |
| **OFI_05** | A Narrative Review of Trends and Challenges in the Home-Grown School Feeding Programme in Nigeria. | Akinade, E.O. |
| **OFI_07** | From evidence to action: How the findings from a stock-taking exercise are shaping strategic planning and strengthening policy coherence | Idoko, K. |
| **OFI_08** | Anthropometric Status And Dietary Practices Of Bank Workers In Jos North Local Government Area, Plateau State, Nigeria | Akosile, B.A. |
| **OFI_09** | Prevalence of cardiovascular disease risk factors among adults (20-60 years) in Nibo, Awka South LGA, Anambra State, Nigeria | Imoh, C. A. |
| **OFI_13** | Perceptions of Religious Leaders on Bible-Based Breastfeeding Counseling in Ibadan, Nigeria | Idowu, K.A. |
| **OFI_14** | Validity and Reliability of the Nigerian Revised General Nutrition Knowledge Questionnaire among University Students in Ibadan, Oyo State, Nigeria | Arabambi, O.A. |
| **OFI_15** | Impact of Nutrition Education on Knowledge and Consumption of Fruit and Vegetable Among Primary School Children In Umuahia Metropolis, Abia State, Nigeria | Okwunodulu, C.C. |
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| **OFI_22** | Optimizing Strategic Development Financing Initiatives for Integrated Early Childhood Development, Food Systems and Nutrition Outcomes in Nigeria. | Victor, A. |

## SUB-THEME 7: Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade) (FI)

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| **PFI_02** | Nutrient Intake and Hygiene Practices among Elderly People in Federal University of Agriculture Abeokuta Farm Families. | Oyedapo O.E |
| **PFI_03** | Triple Burden of Malnutrition in Africa: A Narrative Review of Trends, Determinants and Policy Challenges | Akinade, E.O |
| **PFI_06** | Connecting Household, Health, and WASH Sectors: Determinants of Malnutrition among Under-5 Children in Pakata, Kwara State | Kareem B.R |
| **PFI_10** | Sub-national Evaluation of Nigeria's Progress towards the 2025 Global Nutrition Targets | Adebola, B.A., |
| **PFI_11** | Implementation and Capacity need for the use of Education for Effective Nutrition in Action (ENACT) course developed by the Food and Agriculture Organization (FAO) in Tertiary Institutions in Nigeria. | Nkwoala, C. C. |
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| **PFI_21** | Glycemic Index And Glycemic Load Lowering Effects Of Cayenne Pepper Ginger Tamarind And Tumeric-Enriched Black Sugarcane Jaggery | Jibril, M.M. |

**THEME: Transforming Local Food Systems for Improved Food Security and Nutrition**

# Amino Acid, Microbial and Sensory Qualities of Complementary Food from Wheat (*Triticum aestivum*), Soybean (*Glycine max*), Sesame (*Sesamum indicum)* and Watermelon (*Citrullus lanatus*) Flour Blends

*Awogbenja Makanjuola Dehinde and Simon Chongtamida Dorcas
*Department of Nutrition and Dietetics, College of Medicine and Allied Health Sciences, Nasarawa State University Keffi

***Corresponding Author: dendus12@gmail.com**

**Background and Objectives:** Complementary feeding is a critical phase in child nutrition, particularly in developing countries such as Nigeria, where protein-energy malnutrition remains prevalent. Conventional cereal-based complementary foods, especially wheat and maize, are often limited in essential amino acids such as lysine and tryptophan, thereby compromising their protein quality (1, 2). This study aimed to evaluate the amino acids composition, microbial and sensory attributes of complementary food blends formulated from wheat, soybean, sesame, and watermelon flour.

**Methodology:** Raw materials were processed into flour using standard procedures including cleaning, soaking, fermentation (for soybean), drying at 70°C, roasting, and milling into fine powders. Five formulations (A–E) were developed with varying proportions of wheat, soybean, sesame, and watermelon flour. Amino acid composition was determined using AOAC (3) methods. Microbial analysis was conducted using the pour plate technique to determine total viable count, coliforms, yeast, mold, and Escherichia coli. Sensory evaluation was carried out using a 9-point hedonic scale by 20 semi-trained panelists assessing appearance, aroma, taste, texture, and overall acceptability.

**Results:** The results revealed significant improvements in amino acid composition and nutritional quality of the composite blends compared to the control sample (100% wheat). Sample D (85% wheat, 5% soybean, 8% sesame, 2% watermelon) exhibited the highest total amino acid content, indicating synergistic protein enhancement.

**Table1: Amino Acid Composition of Experimental Samples (g/100 g cP)**

| Amino Acids | A | B | C | D | E |
|---|---|---|---|---|---|
| Histidine | 2.21 ± 0.10 | 2.23 ± 0.08 | 2.62 ± 0.12 | 3.01 ± 0.15 | 3.11 ± 0.15 |
| Isoleucine | 3.64 ± 0.15 | 3.88 ± 0.14 | 3.69 ± 0.16 | 4.49 ± 0.20 | 3.43 ± 0.20 |
| Leucine | 7.13 ± 0.25 | 7.15 ± 0.24 | 7.15 ± 0.26 | 7.44 ± 0.28 | 7.09 ± 0.28 |
| Lysine | 3.70 ± 0.12 | 4.03 ± 0.13 | 6.17 ± 0.22 | 5.35 ± 0.19 | 4.55 ± 0.19 |
| Methionine | 1.92 ± 0.08 | 1.93 ± 0.08 | 2.93 ± 0.11 | 1.59 ± 0.07 | 1.32 ± 0.07 |
| Phenylalanine | 3.77 ± 0.14 | 3.84 ± 0.14 | 4.27 ± 0.16 | 5.75 ± 0.23 | 4.64 ± 0.23 |
| Threonine | 3.88 ± 0.13 | 3.79 ± 0.13 | 4.03 ± 0.15 | 4.28 ± 0.17 | 3.35 ± 0.17 |
| Tryptophan | 1.32 ± 0.06 | 1.29 ± 0.06 | 1.27 ± 0.06 | 1.07 ± 0.05 | 1.17 ± 0.05 |
| Valine | 2.40 ± 0.10 | 2.20 ± 0.09 | 3.28 ± 0.13 | 3.67 ± 0.16 | 4.44 ± 0.16 |
| Alanine | 5.77 ± 0.20 | 6.14 ± 0.21 | 5.57 ± 0.20 | 4.72 ± 0.18 | 4.17 ± 0.18 |
| Arginine | 7.65 ± 0.28 | 7.97 ± 0.29 | 6.99 ± 0.26 | 4.76 ± 0.19 | 5.55 ± 0.19 |
| Cystine | 1.54 ± 0.07 | 1.50 ± 0.07 | 1.61 ± 0.07 | 1.50 ± 0.07 | 1.35 ± 0.07 |
| Glutamic acid | 16.41 ± 0.58 | 16.77 ± 0.59 | 12.56 ± 0.47 | 16.69 ± 0.60 | 13.22 ± 0.60 |
| Aspartic acid | 10.26 ± 0.35 | 10.65 ± 0.36 | 7.49 ± 0.28 | 9.69 ± 0.34 | 9.13 ± 0.34 |
| Glycine | 3.36 ± 0.12 | 3.19 ± 0.11 | 3.68 ± 0.13 | 3.88 ± 0.14 | 3.34 ± 0.14 |
| Proline | 4.10 ± 0.15 | 5.28 ± 0.19 | 3.89 ± 0.15 | 4.64 ± 0.17 | 4.06 ± 0.17 |
| Serine | 3.99 ± 0.14 | 3.56 ± 0.13 | 4.40 ± 0.16 | 5.43 ± 0.20 | 3.74 ± 0.20 |
| Tyrosine | 2.78 ± 0.10 | 2.67 ± 0.10 | 3.05 ± 0.11 | 3.19 ± 0.12 | 3.50 ± 0.12 |
| TAA | 89.19 | 91.26 | 89.33 | 95.03 | 81.16 |
| EAAI(%) | 45.69 | 46.06 | 95.56 | 83.86 | 76.0 |

| | | | | | |
|---|---|---|---|---|---|
| P-BV(%) | 38.32 | 40.69 | 92.46 | 76.71 | 71.14 |

**Key:** A: Wheat= 0%; Soyabean= 0%, Sesame = 0%; Watermelon =0%, B: Wheat= 91%; Soyabean= 5%, Sesame = 2%; Watermelon+2% C: Wheat= 89%; Soyabean= 5%, Sesame = 4%; Watermelon+2% D: Wheat= 87%; Soyabean= 5%, Sesame = 6%; Watermelon+2%; E: Wheat= 85%; Soyabean= 5%, Sesame = 8%; Watermelon+2%

The amino acid profile showed that glutamic acid and leucine were the most abundant amino acids across all samples. Sample C demonstrated superior protein quality indices (Essential Amino Acid Index (EAAI) = 95.56%; Predicted Biological value (P-BV) = 92.46%), indicating high biological utilization. However, sulphur-containing amino acids (methionine and cystine) remained slightly below recommended levels for infants.

Microbial analysis indicated that all samples were microbiologically safe, with low total viable counts ($10^1$–$10^2$ cfu/g), absence of E. coli, and acceptable levels of yeast and mold. These values fall within recommended safety standards, suggesting good hygiene during processing (4).

Sensory evaluation results revealed that Sample A (100% wheat) had the highest overall acceptability (8.25), attributed to superior taste (7.25) and color (8.00). In contrast, nutritionally enhanced samples such as D (7.55) and C (7.35), although acceptable, scored slightly lower, highlighting a trade-off between nutrition and sensory appeal.

**Conclusion and Recommendations**: The study demonstrates that blending wheat with soybean, sesame, and watermelon flour significantly improves the amino acid profile and overall nutritional quality of complementary foods. Sample D emerged as the most nutritionally balanced formulation, while Sample C exhibited the highest protein quality indices. Despite these nutritional advantages, sensory acceptability remains a major challenge, as the control sample (100% wheat) was most preferred. This highlights the importance of integrating nutritional optimization with consumer preferences in food product development.

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# SUB-THEME 1: ORAL

**Subtheme: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title: Food Security Status and Associated Household Characteristics among Rural Households in Bende Local Government Area, Abia State.**

**Ezenwa, H.C., Nwachukwu, D.C*., Adeoye-Agomoh Q.C., Okiyi, C.E., Amalu, C.O.**

Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

Corresponding author, e-mail: debsnwachukwu@gmail.com , +2348135905603

**Keywords: Food insecurity, Rural households, FIES, Abia State**

**Highlights**

- High prevalence of food insecurity among rural households.
- Household income depended mainly on the household head.
- Large household sizes increased food insecurity risk.

**BACKGROUND AND OBJECTIVES**

Food insecurity is presently a major problem facing communities in Nigeria. Nigeria stands out as one of the most affected countries, with about 75% of its population experiencing food insecurity in 2023 [1]. This study aimed to identify the demographic, socio-economic characteristics of rural households in Bende LGA, Abia State and to determine the level of food security. A previous study reported [2] that 90.3% households in the area were food insecure; highlighting the need for further assessment of food security situation among rural households.

**MATERIAL AND METHODS**

A cross-sectional study involving 180 households in Bende Local Government Area of Abia State was conducted using three-stage stratified random sampling method, involving selection of wards, communities, and households. Data were collected using a structured questionnaire covering household demographic, socio-economic data and food security status using the FIES. The questionnaire was validated by lecturers in the Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, and pretested in Ikwuano LGA. Ethical approval was obtained from the ethics committee of Federal Medical Center, Umuahia, and informed consent was obtained from all participants before data collection. Descriptive statistics such as frequency and percentage were used to compute the variables. Pearson correlation coefficient and regression coefficient were used to compare two and more variables respectively. Significances were judged at $p<0.05$. Analysis was conducted using IBM SPSS version 30.

## RESULTS AND DISCUSSION

**Table 1: Demographic and socio-economic characteristics of the respondents**

| Variables | Frequency | Percentage |
|---|---|---|
| **Age of household (HH) members** | | |
| 0 – 5 years | 84 | 46.4 |
| 6 - 14 years | 52 | 29.5 |
| 15 – 24 years | 38 | 21.2 |
| 25 - 34 years | 3 | 1.4 |
| 35 - 65 years | 2 | 0.9 |
| 66 years and above | 1 | 0.6 |
| Total | 180 | 100 |
| **Household size** | | |
| 1 -2 persons | 39 | 21.4 |
| 3 - 5 persons | 57 | 31.8 |
| 6 -8 persons | 39 | 21.6 |
| 9 – 11 persons | 39 | 21.6 |
| Above 11 persons | 7 | 3.6 |
| Total | 180 | 100 |
| **Occupation of respondents** | | |
| Farming | 73 | 40.6 |
| Unemployed/housewife | 44 | 24.4 |
| Business | 42 | 23.5 |
| Teaching | 13 | 7.4 |
| Civil Service | 8 | 4.1 |
| Total | 180 | 100 |
| **Estimated monthly HH income** | | |
| Less than N1000 | 0 | 0.0 |
| N1000 – N10000 | 0 | 0.0 |
| N11000 – N20000 | 54 | 29.9 |
| N21000 – N30000 | 80 | 44.8 |
| N31000 – N40000 | 22 | 11.9 |
| N41000 – N50000 | 9 | 5.0 |
| N51000 – N60000 | 7 | 3.9 |
| N61000 and above | 8 | 4.5 |
| Total | 180 | 100 |
| **Major source of family income** | | |
| Occupation of HH head | 104 | 57.6 |
| Selling farm proceeds | 29 | 16.0 |
| Occupation of other family members | 19 | 10.4 |
| Doing hired labour | 17 | 9.5 |
| Gifts from friends | 6 | 3.4 |
| Petty trading | 4 | 2.3 |
| Investments | 1 | 0.8 |
| Total | 180 | 100 |

The largest proportion of households (31.8%) was the highest of the households' size which had 3-5 members while equal proportions (21.6% each) had 6-8 and 9-11 members. This is consistent with [3] who noted that increasing household size raises food demand and may heighten vulnerability to food insecurity where income is inadequate. The occupation of the household heads was the major source of over half (57.6%) of the family income. Some other sources of family income were selling of farm produce (16.0%),

this is similar to, [4] who found that households relying on a single source of income were significantly more food insecure than those with diversified livelihoods.

**Table 2: Household Food Security Status based on Food Insecurity Experience Scale**

| Food security status | Score points | Frequency(n = 180) | Percentage |
|---|---|---|---|
| Food secure or mildly food insecure | 0-3 | 7 | 3.7 |
| Moderate food insecure | 4-6 | 142 | 79.4 |
| Severely food insecure | 7-8 | 31 | 16.9 |

About 3.7% of the households were food secure or mildly food insecure. Many (79.4%) were moderately food insecure while (16.9%) were severely food insecure, this shows the high prevalence of food insecurity agrees with [1], who reported widespread moderate and severe food insecurity among rural farming households in Nigeria, largely driven by low income, poor dietary diversity, and limited livelihood opportunities.

## CONCLUSION

This study identified the demographic, socio-economic characteristics and determined the level of food security amongst the rural households in Bende L.G.A, Abia state. Food insecurity was showed to be highly prevalent among studied rural households, with only a small proportion of households being food secure. The findings indicate that limited income opportunities and reliance on a single livelihood source contribute substantially to household food insecurity.

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**Theme/sub-theme:** Delivering Better Nutrition for all: Connecting the dots across life cycle systems & sectors/Transforming local food system for improved food security and nutrition

**Title:** Antinutritional Composition of Wheat-Orange-Fleshed Sweet Potato-Breadfruit Composite Flour Blends

**Name of Author(s):** *Obi, L.O.[1], and Olatunde S.J.[2]

**Affiliation of Author(s):** [1]Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso.

[2]Department of Food Science, Ladoke Akintola University of Technology, Ogbomoso.

***Corresponding author, e-mail:** Loveobi446@gmail.com, +2349048809501

**Keywords:** Antinutritional components, Composite flour, Orange-fleshed sweet potato, Bread

**Highlights**

- Reduced oxalate levels indicate low mineral absorption interference.
- OFSP–breadfruit blends increased tannin and alkaloid contents.
- Composite flour balanced maintaining functional quality.

## BACKGROUND AND OBJECTIVES

Composite flour from locally available crops has gained attention as a sustainable alternative to wheat flour because of its potential to improve nutritional quality and reduce dependence on imported wheat. However, incorporating orange-fleshed sweet potato (OFSP) and breadfruit into wheat flour may alter the antinutritional properties of the resulting flour, which can influence nutrient availability and product quality. This study evaluated the antinutritional composition of wheat–OFSP–breadfruit composite flour blends to determine the effects of different blending ratios on oxalate, tannin, and alkaloid contents and assess their suitability for food production.

## MATERIALS AND METHOD

Composite flour blends were prepared using wheat flour, orange-fleshed sweet potato (OFSP) flour, and breadfruit flour at different substitution levels: 90:5:5, 80:10:10, 70:15:15, and 60:20:20 (wheat:OFSP:breadfruit), with a 50:50 OFSP–breadfruit blend used as the control. The antinutritional properties of the flour blends were evaluated by determining oxalate, tannin, and alkaloid contents using standard analytical methods. Data were subjected to analysis of variances, and Duncan multiple range test was used to separate the means.

## RESULTS AND DISCUSSION

Table 1 shows the antinutritional properties of the wheat–OFSP–breadfruit composite flour blends. Oxalate content remained low across all samples (0.15–0.17 mg/100 g), indicating minimal risk of reduced mineral bioavailability. Tannin content increased with higher levels of OFSP and breadfruit substitution, ranging from 0.36 to 0.62 mg/100 g, while alkaloid content also increased from 0.31 to 1.85 mg/100 g. Statistical analysis showed significant differences ($p < 0.05$) among the flour blends for all measured antinutritional parameters. These findings suggest that although increasing OFSP and breadfruit incorporation enhances certain antinutritional compounds, the low oxalate content indicates that the composite flour remains suitable for food applications. Similar observations have been reported in previous studies on composite flours, where increased substitution with non-wheat flours improved nutritional quality while moderately increasing antinutritional factors [3, 2].

**Table 1: Antinutritional Properties of Flour Blends**

| Sample | Oxalate | Tannin | Alkaloid |
|---|---|---|---|
| OFSPB | $0.16 \pm 0.000^{c}$ | $0.36 \pm 0.001^{a}$ | $0.31 \pm 0.024^{a}$ |
| WOFSPB1 | $0.17 \pm 0.000^{c}$ | $0.56 \pm 0.002^{d}$ | $0.56 \pm 0.005^{b}$ |
| WOFSPB2 | $0.16 \pm 0.003^{b}$ | $0.52 \pm 0.004^{c}$ | $0.75 \pm 0.007^{a}$ |
| WOFSPB3 | $0.16 \pm 0.000^{b}$ | $0.48 \pm 0.002^{b}$ | $1.23 \pm 0.009^{b}$ |
| WOFSPB4 | $0.15 \pm 0.002^{a}$ | $0.62 \pm 0.015^{e}$ | $1.85 \pm 0.562^{c}$ |

Means within the same column with different superscript are significantly different ($p<0.05$)

**Key:**
**OFSPB-** Orange Fleshed Sweet Potato (50%) and Breadfruit Flour blend (50%)
**WOFSPB1-** Wheat (90%), Orange Fleshed Sweet Potato (5%), and bread fruit (5%)
**WOFSPB2-** Wheat (80%), Orange Fleshed Sweet Potato (10%), and bread fruit (10%)
**WOFSPB3-** Wheat (70%), Orange Fleshed Sweet Potato (15%), and bread fruit (15%)
**WOFSPB4-** Wheat (60%), Orange Fleshed Sweet Potato (20%), and bread fruit (20%)

## CONCLUSION AND RECOMMENDATION(S)

The study showed that incorporating orange-fleshed sweet potato (OFSP) and breadfruit into wheat flour influenced the antinutritional composition of the composite flour blends. While tannin and alkaloid contents increased with higher levels of OFSP and breadfruit substitution, oxalate levels remained low across all blends, indicating minimal interference with calcium and magnesium absorption. These findings suggest that wheat–OFSP–breadfruit composite flour blends have acceptable antinutritional characteristics and can be considered for food product development. It is recommended that further studies evaluate the sensory properties, shelf life, and consumer acceptability of products developed from these composite flour blends.

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**Sub-theme 1:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Nutritional Quality, Microbial Safety and Storage Stability of Grasshopper-Enriched Cereal-Orange-Fleshed Sweet Potato Complementary Foods for Food Security

**Name of Authors:** *Olayanju, V.O.,[1] Adepoju, O.T.,[2]

1. Department of Home Science and Management, Federal University Gashua, PMB 1005, Nguru road Gashua, Yobe, Nigeria.
2. Department of Human Nutrition, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria.

Email and Phone number of corresponding author: vivienorede@gmail.com, +2348026718446

**Keywords**: Nutritional Quality, Microbial Safety, Grasshopper-Enriched Complementary Foods

**Highlights**

- Grasshopper enrichment improved the nutritional quality of cereal-OFSP complementary foods.
- Grasshopper enrichment did not introduce pathogens into complementary foods.
- Microbiological quality was unaffected by room-temperature or refrigerated storage**.**

## BACKGROUND AND OBJECTIVES

Conventional cereal-based complementary foods are often nutritionally inadequate, contributing to childhood undernutrition in Nigeria. Edible insects provide sustainable, nutrient-dense protein [1], while orange-fleshed sweet potato enhances provitamin A content and supports resilient local food systems [2]. This study evaluated the nutritional quality, microbiological safety, and storage stability of grasshopper-enriched cereal-OFSP complementary foods for improved food and nutrition security while ensuring product safety and quality.

## MATERIALS AND METHODS

Millet, sorghum, and maize were separately fermented for 48 hours, whereas orange-fleshed sweet potato (OFSP) was treated with 5 g/L $Na_2S_2O_5$ before flour production. Twelve (12) complementary food blends were formulated by combining each cereal with a fixed 20% OFSP inclusion rate and varying proportions of *Melanoplus bivittatus* powder at 0%, 10%, 15%, and 20% (w/w), adjusting cereal proportions accordingly (80%, 70%, 65%, and 60%). Baseline proximate composition and microbiological quality (THBC, TCC, THFC, and *Escherichia coli*) were determined before blending; the final formulations were analyzed using standard AOAC and FDA (2020) methods. Storage stability was evaluated over 12 weeks at ambient temperature (biweekly analysis) and −4 °C (quad weekly analysis). Data were evaluated using descriptive statistics and non-parametric tests (Kruskal-Wallis tests) at a statistical significance level of $p < 0.05$.

## RESULTS AND DISCUSSIONS

Proximate analysis (% DM) highlighted *M. bivittatus* as an exceptional nutrient source, possessing the highest crude protein (34.13%) and fat (23.14%). Among cereals, millet yielded the highest protein (16.63%), whereas maize exhibited superior crude fibre (8.05%) and ether extract (16.41%). Although adding 20% OFSP initially diluted blend protein levels through substitution of nitrogen-rich cereal fractions with carbohydrate-rich OFSP, progressive increase of *M. bivittatus* (10–20%) counterweighted this reduction while enhancing crude fat across sorghum and millet mixtures. Notably, millet blend ML-1 (60:20:20) achieved the highest protein content (14.44%) and fibre (5.82%). There were acceptable moisture levels (2.14–8.34%) across formulations, confirming efficient processing and favorable storage stability.

Microbiological evaluation showed insect powder had the highest baseline THBC ($0.70 \times 10^5$ CFU/g) and TCC ($0.40 \times 10^5$ CFU/g), while *Escherichia coli* was absent from all samples. Before and during the 12-week storage period, only *Enterobacter aerogenes* and *Aspergillus niger* were isolated, while no primary pathogens of public health concern were detected in any sample (Table 1). All 12 formulated blends demonstrated excellent microbiological stability, with no significant temporal trends (Friedman test, $p > 0.97$) across both storage conditions (Kruskal–Wallis, $p > 0.67$).

**Table 1**. *Mean Microbial Counts at Equivalent Timepoints under Room Temperature and Refrigerated (-4°C) Storage Conditions*

| Storage Condition | Week | THBC ($\times 10^5$ CFU/g) Mean (Min–Max) | TCC ($\times 10^5$ CFU/g) Mean (Min–Max) | THFC ($\times 10^3$ CFU/g) Mean (Min–Max) | E. coli ($\times 10^5$ CFU/g) |
|---|---|---|---|---|---|
| **Room Temperature** | 4 | 0.358 (0.1–1.0) | 0.400 (0.1–1.0) | 0.375 (0.1–1.0) | ND |
| | 8 | 0.358 (0.1–1.0) | 0.400 (0.1–1.0) | 0.375 (0.1–1.0) | ND |
| | 12 | 0.400 (0.1–1.0) | 0.375 (0.1–1.0) | 0.392 (0.1–1.0) | ND |
| **Refrigerated (-4°C)** | 4 | 0.408 (0.1–1.0) | 0.408 (0.1–1.0) | 0.350 (0.1–1.0) | ND |
| | 8 | 0.400 (0.1–1.0) | 0.375 (0.1–1.0) | 0.375 (0.1–1.0) | ND |
| | 12 | 0.358 (0.1–1.0) | 0.375 (0.1–1.0) | 0.375 (0.1–1.0) | ND |

**Note.** Values are means (minimum–maximum) across all 12 formulated blends at each time point. Weeks 4, 8, and 12 presented as equivalent time points shared by both storage conditions. ND = Not Detected. THFC on $\times 10^3$ scale; THBC and TCC on $\times 10^5$ scale.

## CONCLUSION AND RECOMMENDATIONS

*Melanoplus bivittatus* improved the nutritional adequacy of cereal-OFSP complementary foods without compromising microbiological safety. Controlled cereal-OFSP inclusion is recommended, alongside further antinutrient and heavy-metal evaluation. Its utilization could enhance sustainable complementary feeding and contribute to food and nutrition security.

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**Sub-theme; Transforming Local Food Systems for Improved Food Security and Nutrition**

**Topic:** Formulation and Sensory Profiling of Plant-Based Margarine Produced with Indigenous Palm Kernel, Coconut and Melon Oil Blends

*Aburime, L. C[1] Onyeweaku, E O. [2] and Okoye, C. I.[3]

[1-3] Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences, University of Calabar, Nigeria. PMB 1115, Eta 540004, Etta Agbo Rd, Calabar, Nigeria

[2] Food Evolution Research Centre, College of Business & Economics, University of Johannesburg, Johannesburg 2092. South Africa.

Corresponding author's email: aburimelilian@gmail.com

**Key words:** Margarine, Sensory Evaluation, Oil Blends, Under-utilised seeds

**Highlights:**

- The 25:50:25 (coconut oil:melon oil:palm kernel oil) blend is optimal for margarine production, achieving the highest overall sensory acceptability
- unrefined melon seed oil provides a natural yellow hue and nutty flavour profile that aligns with consumer expectations for premium commercial margarine.
- high concentrations of virgin coconut oil introduce texture and soapy flavour defects when used for margarine formulation without industrial deodorization.

**BACKGROUND AND OBJECTİVES:** Global demand for healthy, sustainable, plant-based foods drives margarine innovation. As an affordable, long shelf-life dairy-butter alternative, margarine acceptability depends on its physicochemical and sensory traits[1]. This study evaluated the sensory characteristics and consumer acceptability of margarine formulated from indigenous, underutilised tropical oil blends. Melon seed, palm kernel, and coconut oils were extracted through aqueous and thermal methods, refined, and combined with a standardised base in three specific volumetric ratios: 50:25:25 (CM), 25:50:25 (MM), and 25:25:50 (PM). **MATERIALS AND METHOD**: Margarine samples were produced by combining these blends with a standardised base recipe of milk, egg yolk, lemon juice, salt, and turmeric, emulsified over an ice bath and solidified in a freezer. A 20-member screened panel evaluated the formulations alongside a commercial control using a 9-point hedonic scale. Data were analyzed using Analysis of Variance (ANOVA) and Fisher's LSD ($P < 0.05$).

**RESULTS AND DISCUSSION:** Results revealed that the melon oil-dominant formulation (MM) performed exceptionally well across most sensory attributes. Sample MM achieved the highest significant scores for colour (8.67), aroma (8.67), taste (7.89), and spreadability (8.78). The superior performance of the melon oil–dominant blend also supports findings from studies on vegetable oil blending, which have demonstrated that combining oils with complementary physicochemical properties can improve the sensory and functional qualities of food products. For example, blending oils with different melting behaviours and fatty acid compositions has been shown to optimise texture, consistency, and consumer acceptability in margarine and spread formulations [2]. Conversely, the coconut oil-dominant formulation (CM) recorded the lowest sensory scores for aroma (5.00), taste (4.60), texture (6.70), and general acceptability (6.18), indicating slight dislike to neutral responses. This could be that without chemical interesterification or thorough industrial deodorization, high concentrations of virgin coconut oil introduces unacceptable flavour and texture defects in table margarines [3].The palm kernel oil formulation (PM) and the commercial control showed statistically similar ($P > 0.05$) ratings for taste, spreadability, and general acceptability, with both being liked moderately.

**CONCLUSION AND RECOMMENDATİON(S):** This study demonstrates that blending underutilised local resources, particularly with a higher concentration of melon seed oil, offers a viable, nutritionally diverse, and consumer-acceptable alternative to conventional commercial margarine.

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Sub-Theme: Transforming Local Food Systems for Improved Food Security and Nutrition

Title: Proximate Composition and Sensory Evaluation of Gluten-Free Multi-Legume Biscuits using Chia gel as binder

*Ezenwa, H.C.[1], Okiyi, C.E.[1], Nebeife, D.U.[1], Obura, C.C.[1], Ugwu, I.C.[1], Ernest, D.C.[1], Ihejieto, G.G.[1], Enemuo, C.C.[1].

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State. Nigeria.

Email: nebeifedorisuchenna@gmail.com Phone: 09159106089

Keywords: Chia gel, Gluten-free biscuits, Multi-legume, Composite flour, Sensory evaluation.

## BACKGROUND AND OBJECTIVES

The growing demand for functional and gluten-free foods has stimulated the development of nutritious bakery products from locally available plant-based ingredients. Wheat-based biscuits are unsuitable for individuals with gluten intolerance and are generally low in protein and dietary fibre [1]. Composite flours produced from legumes improve the nutritional quality of baked products by increasing protein, fibre, and mineral contents [2]. Chia gel serves as a natural hydrocolloid that enhances dough binding, moisture retention, and texture in gluten-free products [3]. This study aimed to produce gluten-free multi-legume biscuits using chia gel as a binder and evaluate their proximate composition and sensory properties.

## MATERIALS AND METHODS

An experimental study design was employed. Four gluten-free biscuit formulations (CRT1 CHG, CHS CHC) were prepared using varying proportions of corn flour, soybean flour, cowpea flour, defatted groundnut flour and chia gel (10:15:10:10 respectively), while a commercial biscuit (CRT2) served as the commercial control. Proximate composition was determined using standard AOAC methods [4]. Sensory evaluation was conducted by 40 semi-trained panelists using a 9-point hedonic scale to assess appearance, taste, mouthfeel, aroma and overall acceptability. Data were analyzed using Analysis of Variance (ANOVA), and Duncan's Multiple Range Test was used to separate means at $p < 0.05$.

## RESULTS AND DISCUSSION

The incorporation of chia gel and composite legume flours significantly improved the nutritional quality of the biscuits. This finding agrees with the report of [6] who observed that incorporation of protein-rich and fiber-rich ingredients into baked products reduced moisture availability through increased water-binding capacity. Moisture content ranged from 4.62–9.22%, protein from 16.97–24.09%, fat from 4.03–8.96%, crude fibre from 1.97–3.67%, ash from 1.34–3.17%, carbohydrate from 52.30–79.60%, and energy from 369.45–431.71 kcal/100 g. Sample CHG recorded the highest protein (24.09%), fibre (3.67%) and ash (3.17%), while CHS had the highest fat content (8.96%). Although the commercial control (CRT2) received the highest sensory scores, CHC showed the best overall acceptability among the formulated samples. These findings demonstrate that chia gel and legume flours can enhance the nutritional quality of gluten-free biscuits while maintaining acceptable sensory characteristics [3,5].

**Table 1: PROXIMATE COMPOSITION OF GLUTEN-FREE MULTI-LEGUME BISCUITS PRODUCED USING CHIA GEL**

| Sample | Moisture Content (%) | Crude Protein (%) | Fat (%) | Crude Fiber (%) | Ash (%) | Carbohydrate (%) | Energy (Kcal) |
|---|---|---|---|---|---|---|---|
| CRT1 | 9.22a ± 0.03 | 18.78c ± 0.03 | 4.03e ± 0.03 | 2.12d ± 0.03 | 1.34d ±0.02 | 64.52b ± 0.04 | 369.45e ± 0.00 |
| CHG | 8.15b ± 0.03 | 24.09a ± 0.03 | 8.64b ± 0.04 | 3.67a ± 0.04 | 3.17a ± 0.04 | 52.30e ± 0.02 | 383.26d ± 0.29 |
| CHS | 7.80c ± 0.01 | 24.05a ± 0.03 | 8.96a ± 0.04 | 3.58b ± 0.03 | 3.06b ± 0.04 | 52.51d ± 0.02 | 386.82b ± 0.35 |
| CHC | 8.17b ± 0.02 | 23.50b ± 0.02 | 8.47c ± 0.04 | 3.41c ± 0.02 | 3.03b ± 0.02 | 53.45c ± 0.04 | 383.95c ± 0.09 |
| CRT2 | 4.62d ± 0.02 | 16.97d ± 0.02 | 5.05d ± 0.03 | 1.97e ± 0.04 | 1.81c ± 0.02 | 79.60a ± 0.04 | 431.71a ± 0.00 |

**Table 2: SENSORY EVALUATION OF GLUTEN-FREE MULTI-LEGUME BISCUITS USING CHIA GEL (Appearance, Taste, Mouthfeel, Aroma, and General Acceptability)**

| Sample | Appearance | Taste | Mouth-feel | Aroma | General Acceptability Calculated |
|---|---|---|---|---|---|
| CRT1 | 6.88ab ± 1.24 | 5.20b ± 1.63 | 5.52b ± 1.81 | 6.64a ± 1.85 | 6.06b ± 1.28 |
| CHG | 4.72d ± 1.74 | 4.44b ± 1.42 | 5.00b ± 1.83 | 5.44b ± 1.56 | 4.90c ± 1.22 |
| CHS | 5.80c ± 1.47 | 4.84b ± 1.55 | 4.96b ± 1.59 | 5.40b ± 1.63 | 5.25c ± 1.25 |
| CHC | 6.16bc ± 1.49 | 5.20b ± 1.53 | 5.24b ± 1.51 | 5.68b ± 1.84 | 5.57bc ± 1.34 |
| CRT2 | 7.48a ± 1.29 | 7.44a ± 1.23 | 7.28a ± 1.17 | 7.08a ± 1.29 | 7.32a ± 0.97 |

Keys:
CRT1: Corn Flour 90%, Cowpea 0%, Soybeans 0%, Groundnut 0%, Chia Gel 10%
CHG: Corn Flour 40%, Cowpea 10%, Groundnut 20%, Soybeans 15%, Chia Gel 15%
CHS: Corn flour 40%, Cowpea 15%, Soybean 20%, Groundnut 10%, Chia Gel 10%
CHC: Corn flour 40%, Cowpea 20%, Soybeans 15%, Groundnut 15%, Chia Gel 10%:
CRT2: (Control)

## CONCLUSION AND RECOMMENDATION(S)

The study demonstrated that chia gel can be successfully used as a natural binder in gluten-free multi-legume biscuits, resulting in improved nutritional quality and acceptable sensory characteristics. The CHG formulation exhibited the best nutritional profile, while CHC showed the highest consumer acceptability among the formulated samples. The use of chia gel and locally available legume flours is therefore recommended for the development of nutritious gluten-free bakery products. Further studies should evaluate micronutrient composition, shelf-life stability and consumer acceptance on a larger scale.

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**Theme/Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

Title: **Effect of Locally Formulated Carrot–Ginger Micronutrient Supplement On the Immunological and Liver Biomarkers Among HIV Positive Patients on Antiretroviral Therapy.**

Pius, J.Z.[1], Bali, E.M.[1], Buzu, S.B., Fatima, I.A, Yahaya, L.[1], Sa'ad, U.[1], Sani, K.S.[1], Saratu, A.[1] and Jamila, I.A.[1], Aisha, Y. A[1,] Benjamin, C., Mariya, Dauda.

[1]Department of Science Laboratory Technology-Chemistry and Biochemistry, Nuhu Bamalli Polytechnic, Zaria, Kaduna State, Nigeria.

*Corresponding author:* zamanijo2013@gmail.com; +2348035777866.

**Keywords:** Antiretroviral therapy; Carrot–ginger; Micronutrient supplement; Hepatoprotection.

**Highlights**

- Carrot–ginger supplement improved $CD4^+$ T-cell counts in HIV patients.
- Supplementation reduced serum ALT and AST enzyme levels.
- Locally formulated supplement showed potential as low-cost nutrition therapy.

**Background and Objectives**

Micronutrient deficiencies are common in people living with HIV, especially in low-resource settings, leading to weakened immunity, oxidative stress, and increased opportunistic infections [1,2]. Although ART improves survival, long-term use may cause metabolic and liver complications [3]. Carrot (Daucus carota) and ginger (Zingiber officinale) contain antioxidant compounds [4]. This study evaluated a carrot–ginger supplement on immunity and liver biomarkers in HIV patients on ART.

**Materials and Method**

A randomized controlled study involving 90 HIV-positive adults at Kafanchan General Hospital, Nigeria, assigned participants to ART only, ART plus SelACE®, or ART plus carrot–ginger supplement. Over 90 days, BMI, $CD4^+$ counts, and liver enzymes (ALT, AST) were measured. Data were analyzed using SPSS v25, ANOVA, and Pearson correlation ($p < 0.05$).

**Results and Discussion**

Results showed significant improvements ($p < 0.05$) in $CD4^+$ T-cell counts, BMI, and serum micronutrient levels among participants receiving carrot–ginger supplementation compared with the ART-only group. At day 90, the carrot–ginger group recorded higher $CD4^+$ counts ($401.86 \pm 9.03$ cells/μL) than the control group ($380.47 \pm 11.02$ cells/μL), while the SelACE® group showed the highest value ($477.23 \pm 8.29$ cells/μL). Supplemented groups also had significantly lower ALT and AST levels, suggesting hepatoprotective effects. These findings support reports that antioxidant-rich foods may reduce oxidative stress and liver damage in HIV patients receiving ART.

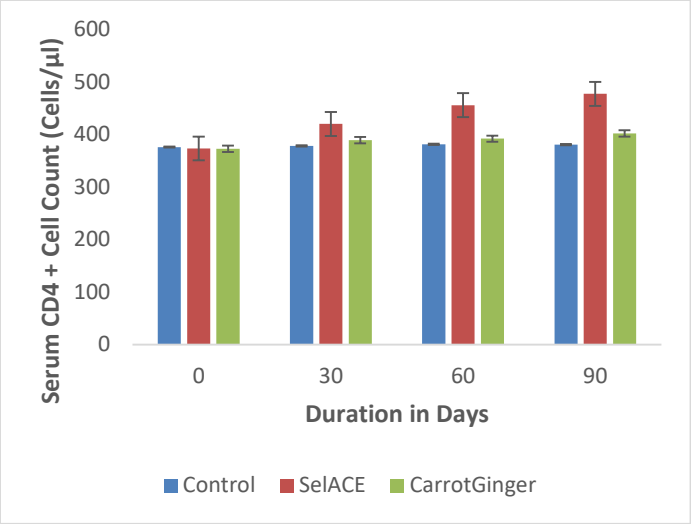



Figure 1: Represent the mean serum $CD4^{+}$ cell counts of HIV Positive patients before and after micronutrients supplementation

**Conclusion and Recommendations**

The locally formulated carrot–ginger micronutrient supplement significantly improved immune response and reduced liver enzyme elevation among HIV-positive patients receiving ART. The supplement may serve as an affordable nutritional adjunct in HIV management, particularly in low-resource communities. Further large-scale clinical studies are recommended to validate its long-term therapeutic benefits and safety.

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**Theme/sub-theme:** Transforming Local Food System for Improved Food Security and Nutrition

**Title**: Evaluation of the Nutritional Composition, Sensory Property and Postprandial Glycemic Response of Cookies Made from Composite Flour Formulated from *Chrysophyllum Albidum* Seed and *Pleurotus Ostreatus*

**Authors**: *Tobiloba T.D.[1,2], Ajayi K.[2] and, Talabi J.Y.[2]

**Authors Affiliation**: [1]Department of Food Science and Technology, Bamidele Olumilua University of Education, Science and Technology Ikere-Ekiti.

[2]Department of Human Nutrition and Dietetics, Afe Babalola University, Olusegun Obasanjo Way, Ado-Ekiti 360102, Ekiti State, Nigeria.

**Corresponding author:** tobilobadaniel3@gmail.com, +2348167840570

**Keywords:** African star apple seeds, oyster mushroom, wheat, postprandial glucose and glycemic response.

**Highlights**

- Composite cookies showed improved protein, fibre and ash contents
- Predicted glycemic index and postprandial glucose response reduced
- Cookies with 15% substitution had best functional and sensory quality

**Abstract**

**Background and Objective**: The increasing burden of diet-related metabolic disorders, including hyperglycemia and diabetes, has stimulated interest in functional foods with improved nutritional quality and glycemic response [1]. This study was carried out to evaluate the nutritional composition, sensory properties, and postprandial glycemic response of cookies produced from composite flour incorporating *Chrysophyllum albidum* seed and *Pleurotus ostreatus*.

**Materials and Methods**: Wheat flour, African star apple seeds, and oyster mushrooms were processed into flours and formulated into composite blends at substitution levels of 5%, 10%, and 15% (mushroom and seed flours), with 100% wheat flour as a control. Cookies were produced using the creaming method and baked at 180 °C. Proximate, mineral, vitamin, and phytochemical compositions were analysed using Association of Official Analytical Chemists methods [2], while antioxidant capacity was assessed using radical cation decolorization assay. In vitro starch digestibility and predicted glycemic index were determined enzymatically. Sensory evaluation was conducted using a nine-point hedonic scale. Postprandial glycemic response was assessed in healthy adults, with blood glucose measured over 120 minutes and incremental area under the curve (iAUC) calculated.

**Results and Discussion:** Substitution of wheat flour with African star apple seed and oyster mushroom flour significantly ($p < 0.05$) improved the nutritional quality of the cookies compared with the control sample. Moisture, protein, fat, fibre, and ash contents increased from 14.50% to 16.20–19.10%, 10.20% to 13.90–17.80%, 1.50% to 13.80–18.40%, 0.60% to 3.10–5.80%, and 0.80% to 4.80–6.90%, respectively, while carbohydrate content decreased markedly from 72.40% to 31.65%. Mineral composition also increased significantly, particularly calcium (150.40–245.60 ppm), potassium (450.25–655.80 ppm), magnesium (7.20–14.95 ppm), and phosphorus (50.10–74.85 ppm). Similarly, vitamin contents improved, with β-carotene increasing from 0.85 to 4.10 mg/100 g, vitamin C from 1.20 to 9.20 mg/100 g, vitamin E from 0.50 to 2.45 mg/100 g, and folate from 95.20 to 352.80 µg/100 g. Sensory evaluation showed that the composite cookies remained generally acceptable, with texture (4.80–6.20), taste (5.40–6.50), colour (4.50–

7.80), aroma (5.30–7.50), and overall acceptability (4.80–5.50) scores comparable to the control, especially at moderate substitution levels. In addition, predicted glycemic index values and postprandial glycemic response decreased with increasing substitution, as evidenced by the significant reduction in incremental area under the curve (iAUC) from +159 in the control sample to −174 at 15% substitution, indicating improved glycemic properties and potential suitability of the cookies for blood glucose management. The increase in protein content suggests improved nutritional quality, as proteins are essential for body building and metabolic functions [3].

**Table 1: Proximate composition of the cookies**

| Samples | Moisture (%) | Protein (%) | Fat (%) | Crude Fibre (%) | Ash (%) | CHO (%) |
|---|---|---|---|---|---|---|
| **WF** | 14.50 ± 0.25$^{d}$ | 10.20 ± 0.28$^{d}$ | 1.50 ± 0.10$^{d}$ | 0.60 ± 0.05$^{d}$ | 0.80 ± 0.06$^{d}$ | 72.40 ± 0.70$^{a}$ |
| **WMAF1** | 16.20 ± 0.28$^{c}$ | 13.90 ± 0.31$^{c}$ | 13.80 ± 0.35$^{c}$ | 3.10 ± 0.18$^{c}$ | 4.80 ± 0.22$^{c}$ | 48.20 ± 0.62$^{b}$ |
| **WMAF2** | 17.75 ± 0.34$^{b}$ | 15.78 ± 0.42$^{b}$ | 16.19 ± 0.48$^{b}$ | 4.39 ± 0.25$^{b}$ | 5.98 ± 0.31$^{b}$ | 39.91 ± 0.55$^{c}$ |
| **WMAF3** | 19.10 ± 0.39$^{a}$ | 17.85 ± 0.47$^{a}$ | 18.40 ± 0.53$^{a}$ | 5.80 ± 0.33$^{a}$ | 7.20 ± 0.36$^{a}$ | 31.65 ± 0.48$^{d}$ |
| **LSD ($p < 0.05$)** | **0.42** | **0.55** | **0.65** | **0.30** | **0.35** | **1.10** |

**Keynote:**
**WF:** (100% Wheat Flour)
**WMAF1:** (90% Wheat 5% Oyster Mushrooms and 5% Africa Star Apple Seeds Flour)
**WMAF2:** (80% Wheat 10% Oyster Mushrooms and 10% Africa Star Apple Seeds Flour)
**WMAF3:** (70% Wheat 15% Oyster Mushrooms and 15% Africa Star Apple Seeds Flour)

**Conclusion and Recommendation**

The incorporation of African star apple seed and oyster mushroom flours improved the nutritional quality, reduced glycemic response, and maintained good sensory acceptability of cookies, with 15% substitution showing the best overall performance. Therefore, up to 15% substitution is recommended for functional cookie production, while further studies should evaluate long-term health effects and large-scale application.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Effect of dehulling and fermentation on functional properties of quality protein maize (*zea mays* l.) Varieties (sammaz 14, sammaz 17) and sammaz 33 (non- qpm**)**

**Name of Author (s): *[1]Ahmad A., [1]Saleh H., [1]Abdul Hamid A.W., [1] Shaibu S. L., Halilu A.D., Anigo K.M., Owolabi O.A. and Ibrahim S.**

**Affiliation of Author (s):**
1. Department of Nutrition and Dietetics, Federal University of Agriculture Mubi (FUAMB), Adamawa State.
2. Department of Biochemistry, Ahmadu Bello University Zaria.
3. Department of Plant science, Ahmadu Bello University Zaria.
*Corresponding author, e-mail: adamahmad2018@gmail.com
**Keywords: Maize, Fermentation, dehulling and Functional properties**

**Highlights**
- The ability of the proteins of these flours to bind with oil makes it useful in food system where optimum oil absorption is desired.
- Nutritionally, loose bulk density promotes easy digestibility of food products, particularly among children with weak digestive system
- The gelatinization and swelling power test provided suitable predictive method for identifying noodle-quality flours

**BACKGROUND AND OBJECTİVES:**
Maize (*Zea mays* L.) is a very cheap source of nutrient to humans not only in Africa, but across the world [1]. This study aimed at investigating the effect of dehulling and fermentation on functional properties of Quality Protein Maize (QPM) varieties *(*sammaz 14, sammaz 17) and sammaz 33 (Non-QPM). To stem the scourge of morbidity and mortality rates of under five children in Nigeria due to malnutrition, there is need to explore and utilize plant resources as cheaper and abundant nutrient sources.

**MATERIALS AND METHOD:**
Samples were obtained from seed unit, Department of Plant Science, Institute of Agricultural Research, Ahmadu Bello University, Zaria. The three varieties were divided into two (whole and dehulled) each and then subjected to fermentation for 0h, 12h, 24 and 36hr.

**RESULTS AND DISCUSSION:**
Result obtained shows that, water absorption capacity (WAC) in dehulled sammaz14 ranges from 1.5±0.02 for 36hr to 1.70±0.08 non-fermented and it ranges from 1.83±0.02 fermented for 12hr to 1.89±0.12 non-fermented in the whole grain. The oil absorption capacity (OAC) in sammaz14 dehulled ranges from 1.22±0.02 for 36hr to 1.40±00 in non- fermented while in the whole grain it ranges from 1.34 ± 0.02 non-fermented to1.42 ± 0.01 at 36hrs.The least gelation concentration in sammaz14 dehulled ranges from 8.01±0.13 at 36hrs to 11.59±0.13 at 0hr and in the whole grain it ranges from 11.56 ± 0.08 for 12hrs to 1.70 ± 0.42 non-fermented. The water absorption capacity increases with increase fermentation time. These findings agrees with Grah, et al. [2]. And also the decrease in water absorption capacity with fermentation in the Sammaz 14 time agree with Ogodo, et al. [3]. who reported decrease in WAC with increasing fermentation time. Microbial activities of food products with low water absorption capacity is be reduced. Hence the shelf-life of such product would be extended.

## CONCLUSION

Based on these results, it can be concluded that fermentation and dehulling improved functional performance, expanded the technological versatility and nutritional application of the maize flour in both household and industrial purposes.

## RECOMMENDATİONS:

The combined processing methods should be used in complimentary feeds, weaning foods formulation and products development.

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**Theme/sub-theme:** Transforming Local Food Systems For Improved Food Security and Nutrition
**Title:** Antibacterial Activity of Mentha spicata Essential Oil against Selected Food Spoilage Bacteria.
**Name of Author (s): *[1]Saleh H., [1]Ahmad A., [1]Lawal S. S., [2]Sufyan L.Y., and [3]Sa'eedu A. M.**
**Affiliation of Author (s):**
1. Department of Nutrition and Dietetics, Federal University of Agriculture Mubi (FUAMB), Adamawa State.
2. Department of Nutrition and Dietetics, Federal University Kabo, Kano state.
3. Department of Nutrition and Dietetics, University of Maiduguri (UNIMAID), Borno state.
*Corresponding author, e-mail: harisusaleh274@gmail.com
**Keywords: Mentha spicata, essential oil, antibacterial activity, natural preservatives**
**Highlights**

- *Mentha spicata* essential oil had a light-yellow color, and a yield of 0.46%.
- The essential oil showed dose-dependent antibacterial activity against all tested bacteria.
- The findings suggest that *Mentha spicata* essential oil has food preservative potential

**BACKGROUND AND OBJECTİVES:**
The increasing incidence of food spoilage and foodborne diseases caused by microbial contamination has raised global concerns regarding food safety. Synthetic preservatives commonly used in food preservation have been associated with potential health risks, leading to increased interest in natural alternatives. Investigating the antibacterial potential of mint essential oil against food spoilage bacteria is important for developing safer and more natural food preservative [1]. This study aimed at evaluating the yield and antibacterial activity of essential oil extracted from *Mentha spicata* leaves against selected food spoilage bacteria.
**MATERIALS AND METHOD:**
Fresh leaves of *Mentha spicata* were collected from Sharada Phase I garden, Kano State, Nigeria. Essential oil extraction was carried out using the steam distillation method. The antibacterial activity of the essential oil was evaluated using the agar well diffusion method. Mueller-Hinton agar plates were inoculated with test organisms: Escherichia coli, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Shigella dysenteriae* and *Pseudomonas aeruginosa*. Wells were created in the agar and filled with different concentrations of the essential oil (12.5%, 25%, 50%, and 100%). Plates were incubated at 37°C for 24 hours, and zones of inhibition were measured in millimeters. The percentage yield of essential oil was calculated using: Yield (%) = (mass of the oil obtained/mass of the raw plant) ×100.
**RESULTS AND DISCUSSION:**
The essential oil of *Mentha spicata* appeared light yellow in color with a characteristic aromatic odor. The extraction yielded 0.46%. The antibacterial assay showed that the essential oil exhibited inhibitory activity against all tested bacterial strains. The zones of inhibition increased with increasing concentration of the oil, indicating a dose-dependent effect. The results demonstrate that *Mentha spicata* essential oil possesses significant antibacterial activity against common food spoilage microorganisms. The observed antimicrobial effect can be attributed to the presence of bioactive compounds which are known to disrupt bacterial cell membranes and interfere with cellular metabolism [2]. The dose-dependent increase in antibacterial activity aligns with previous studies, indicating that higher concentrations of essential oils enhance their effectiveness. These findings support the evidence that plant-derived essential oils can serve as natural food preservatives [3].
**CONCLUSION**
This study confirms that *Mentha spicata* essential oil exhibits an antibacterial activity against some food spoilage bacteria. A yield of 0.46% and demonstrated inhibitory effects, mint essential oil shows strong potential as a natural alternative to synthetic food preservatives.

**RECOMMENDATİONS:**

• Further researches should be carried out on the minimum inhibitory concentration (MIC) and evaluation in real food preservation systems.

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**Theme/Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Women's Participation in Local Food Value Chains and Household Nutrition in Sokoto Metropolis, Nigeria

**Name of Author(s):** Ahmad, F.M.[1]*, Manga, B.S.[1] and Oforghor, A.O.[1]
**Affiliation of Author(s):** [1]Department of Home Economics, Federal College of Education, Gidan Madi, Sokoto State, Nigeria;
**Corresponding Author:** *Corresponding author, e-mail: ahmadfatimamusa158@gmail.com, +2348137332260, +2348166037720

**Keywords:** Women participation; food value chains; Sokoto Metropolis; household nutrition

**Highlights**

- Women are predominantly active in food marketing and retailing segments
- Participation is significantly driven by market accessibility and credit access
- Women's involvement directly enhances household food availability and child health

**BACKGROUND AND OBJECTIVES**

Women are central economic actors in sub-Saharan food systems, yet they face persistent structural and socio-cultural barriers [1]. While their role is recognized, there is limited context-specific evidence from Northern Nigeria on how their participation directly influences household nutritional outcomes [2]. This study examines the extent of women's participation in local food value chains in Sokoto Metropolis and its contribution to household nutrition.

**MATERIALS AND METHOD**

A descriptive cross-sectional survey design was adopted. The population comprised 40,000 women engaged in food value chain activities in Sokoto Metropolis, from which a sample of 380 was selected using stratified random sampling. Data were collected via the Women Participation in Food Value Chain Scale (WPFVCS) and the Household Nutrition Assessment Scale (HNAS), both validated by experts with Cronbach's alpha reliability coefficients above 0.80. Data were analyzed using descriptive statistics (frequencies, percentages, mean, and standard deviation).

**RESULTS AND DISCUSSION**

Findings revealed high overall participation (Grand Mean = 3.27), with the highest concentration in marketing (Mean = 3.62) and processing (Mean = 3.45). Factors significantly influencing participation included market accessibility (Mean = 3.67) and access to credit (Mean = 3.58) [3]. Importantly, women's participation was found to improve household food availability (Mean = 3.55) and enhance the nutritional quality of meals (Mean = 3.52) [4]. These results imply that women act as primary agents of food security, converting economic engagement into better dietary diversity for their families [5].

**CONCLUSION AND RECOMMENDATION(S)**

The study concludes that women are vital actors in Sokoto's food systems, particularly in downstream activities, and their involvement is a critical determinant of household welfare. It is recommended that government and development agencies strengthen women-focused financial inclusion strategies and improve market infrastructure. Additionally, community leaders should intensify sensitization programs to reduce socio-cultural barriers limiting women's economic productivity.

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**Theme/Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Food Systems Transformation and Malnutrition Reduction in Low-Income Communities: A Study of Zuru Area of Kebbi State, Nigeria

**Name of Author(s):** Manga, B.S.[1]*, Ahmad, F.M.[2], and Adigidzi, E.A.[3]

**Affiliation of Author(s):** [1]Department of Home Economics, Federal College of Education, Gidan Madi, Sokoto State, Nigeria; [2]Department of Home Economics, Federal College of Education, Gidan Madi, Sokoto State, Nigeria; [3]Department of Home Science and Management, Nasarawa State University, Keffi, Nigeria.

**Corresponding Author:** *Corresponding author, e-mail: stephenbikisu@gmail.com, +2348161512902

**Keywords:** Food systems; malnutrition; food security; Zuru

**Highlights**

- Traditional subsistence farming and weak market access drive local food insecurity
- Poverty and low agricultural productivity are primary causes of malnutrition
- Strengthening local value addition significantly improves household nutrition

**BACKGROUND AND OBJECTIVES**

Malnutrition and food insecurity remain critical public health challenges in rural Kebbi State. While Zuru possesses significant agricultural potential, local food systems are constrained by poor infrastructure and post-harvest losses [1]. This study examines how transforming these local food systems through improved production, processing, and distribution can contribute to reducing malnutrition in low-income communities within the Zuru area.

**MATERIALS AND METHOD**

A descriptive survey research design was adopted, utilizing both primary and secondary data. The study population included low-income households, farmers, and community leaders in Zuru. A sample of 150 respondents was selected using simple random sampling. Primary data were collected via structured questionnaires and interviews, while secondary data were sourced from academic journals and government reports. Data were analyzed using descriptive statistics, including frequencies and percentages.

**RESULTS AND DISCUSSION**

Findings revealed that malnutrition is primarily driven by poverty, low farm yields, and inadequate nutrition education [2]. Local food systems were found to be largely subsistence-based with minimal irrigation or storage facilities, leading to significant seasonal food instability. However, analysis indicated that promoting indigenous nutritious foods, such as those derived from millet and sesame, has the potential to address protein-energy malnutrition [3]. These results imply that nutrition-sensitive agriculture and local value addition are essential for increasing dietary diversity [4].

**CONCLUSION AND RECOMMENDATION(S)**

The study concludes that sustainable transformation of local food systems is essential for reducing malnutrition and improving community well-being in Zuru. It is recommended that the government invests in rural agricultural infrastructure and irrigation. Furthermore, community-based food processing and storage facilities should be established to reduce post-harvest losses and enhance the year-round availability of nutritious foods [5].

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**Theme/Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title: CONSUMER PERCEPTION AND ACCEPTABILITY OF INDIGENOUS SOUPS AMONG STUDENTS IN TERTIARY INSTITUTIONS IN OGUN STATE, NIGERIA**

**Name of Author(s):** Ogundiran, V.E.*[1], Odebode, O.D.[2] and Adegunwa, M.O.[2]
**Affiliation(s):**
[1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.
[2],Department of Hospitality and Tourism, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.
*Corresponding author, e-mail: victorenny2004@gmail.com, +2347089887164
**Keywords:** Indigenous soups, Consumer perception, Acceptability, Tertiary institutions
**Highlights**

- Consumer perception of indigenous soups was favourable among 53.0% of respondents
- Over 52.7% of students showed high willingness to try and accept indigenous soups
- Cultural identity and nutritional value were key drivers of indigenous soup consumption

## BACKGROUND AND OBJECTIVES

Indigenous soups (IS) constitute a vital component of Nigerian food culture and are rich sources of micronutrients, antioxidants, and bioactive phytochemicals that protect against degenerative diseases [1]. Indigenous soups are increasingly being displaced by continental dishes, particularly among youth in urban settings [2]. Studies on the perception and acceptability of indigenous soups among students in Nigerian tertiary institutions remain scarce. This study therefore assess consumer perception and acceptability of indigenous soups among students in selected tertiary institutions in Ogun State, Nigeria.

## MATERIALS AND METHOD

A cross-sectional descriptive survey design was employed. The study was conducted across three purposively selected tertiary institutions in Ogun State: Federal University of Agriculture, Abeokuta (FUNAAB); Tai Solarin University of Education, Ijebu-Ode (TASUED); and Olabisi Onabanjo University, Ago-Iwoye (OOU). A structured, validated questionnaire was administered to randomly selected students from each institution. The questionnaire captured respondents' socio-demographic characteristics, perception of indigenous soups, willingness to try and accept selected soups, frequency of consumption, and factors influencing consumption. Data were analysed using descriptive statistics (frequencies, percentages, and mean scores) and inferential statistics (one-way ANOVA) to test for significant differences between institutions at $p \leq 0.05$.

## RESULTS AND DISCUSSION

The mean age of respondents was 22 years, with 94.3% being undergraduate students. Consumer perception of indigenous soups (IS) was generally favourable, with 53.0% of respondents rating their overall perception positively. More than half of respondents (52.7%) demonstrated a high level of willingness to try and accept indigenous soups. Regarding soup preference, Efo riro ($\bar{x}$=1.93) was ranked highest for consumer willingness to try, followed by Ewedu ($\bar{x}$=1.91), Gbegiri and Seafood Okra ($\bar{x}$=1.83 each). For frequency of consumption, Efo riro ($\bar{x}$=2.97) was the most frequently consumed indigenous soup, followed by Ewedu ($\bar{x}$=2.83), Pepper Soup ($\bar{x}$=2.78), and Egusi ($\bar{x}$=2.68) (Table 1). Among factors influencing consumption, "Indigenous soups are an important type of food delicacy" ($\bar{x}$=4.31, Rank Ist) ranked highest while (Table 1). These findings are consistent with previous reports that cultural identity, nutritional awareness, and social belonging are strong predictors of indigenous food acceptance [2, 3].

**Table 1: Mean scores rank for frequency and factors influencing consumption of selected indigenous soups (IS)**

| **Frequency of Consumption of IS↕** | **Mean Score ($\bar{x}$)** | **Rank** |
|---|---|---|
| Efo riro | 2.97 | 1st |
| Ewedu soup | 2.83 | 2nd |
| Pepper soup | 2.78 | 3rd |
| Egusi soup | 2.68 | 4th |
| **Factor influencing the Consumption of IS↓** | **Mean Score ($\bar{x}$)** | **Rank** |
| Indigenous soups are an important food delicacy | 4.31 | 1st |
| Indigenous soups reflect cultural inheritance | 4.30 | 2nd |
| Indigenous soups represent social/ethnic values | 4.09 | 3rd |

↕*Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Always;* ↓*Scale: 1=Strongly Disagree to 5=Strongly Agree*; *IS-Indigenous Soup*

## CONCLUSION AND RECOMMENDATION(S)

Consumer perception of indigenous soups among students in Ogun State tertiary institutions was largely favourable, and the majority demonstrated willingness to accept these soups. There should education programmes to reinforce awareness of the nutritional and cultural value of indigenous soups.

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**Sub-theme:**
Transforming Local Food Systems for Improved Food Security and Nutrition
**Title:** Nutritional Profile of *Apis mellifera adansonii* Tissue from Nigeria: Implications for Apicultural and Nutritional Research
**Author:** *Ekeanyanwu, Chukwuma Raphael
**Affiliation:**
[1]Department of Biochemistry, Imo State University, Owerri, Imo State, Nigeria
*Corresponding author:* ekeanyanwu.chukwuma@imsuonline.edu.ng
**Keywords:** *Apis mellifera adansonii*, entomophagy, amino acids, micronutrients
**Highlights**

- Bee tissue contained high protein and B-complex vitamins
- Oleic acid was the dominant unsaturated fatty acid detected
- Calcium, potassium and selenium levels were exceptionally high

## BACKGROUND AND OBJECTIVES

Edible insects are increasingly recognised as sustainable alternatives to conventional animal protein because of their high nutrient density and lower environmental footprint [1]. In Nigeria, *Apis mellifera adansonii* contributes significantly to pollination, biodiversity, and traditional medicine, yet limited information exists on the nutritional composition of its tissue [2]. Most available studies focus on European honey bee subspecies or bee products such as honey and pollen, leaving a knowledge gap regarding the nutritional value of Nigerian honey bee tissue. This study therefore evaluated the proximate composition, fatty acid profile, mineral content, amino acid composition, and vitamin profile of adult worker *A. mellifera adansonii* tissue collected from Imo State, Nigeria, to assess its potential contribution to food security and nutritional diversification.

## MATERIALS AND METHODS

Adult worker honey bees were collected from five apiaries in Amaraku, Imo State, Nigeria, during April–May 2025. Samples were identified morphologically, rinsed, freeze-dried, homogenised, and analysed in triplicate. Proximate composition was determined using standard AOAC methods. Fatty acid methyl esters were analysed using GC-FID, amino acids by HPLC after acid hydrolysis, minerals by ICP-OES and flame photometry, while vitamins were quantified using HPLC techniques. Data were analysed using IBM SPSS Statistics version 31 and expressed as mean ± standard deviation.

## RESULTS AND DISCUSSION

The tissue contained high crude protein (30.30±1.86%) with moderate fat (9.52±0.74%) and energy value (235.24±15.58 kcal/100 g), supporting its suitability as a protein-rich supplementary food. The fatty acid profile showed predominance of monounsaturated fatty acids (51.10±2.86%), especially oleic acid, while polyunsaturated fatty acids were absent. Mineral analysis revealed exceptionally high potassium (105793.28±17.64 mg/100 g), calcium (3764.31±12.64 mg/100 g), sodium (9415.49±9.64 mg/100 g), magnesium (427.93±2.14 mg/100 g), and selenium (0.5167±0.00 mg/100 g), although iron and zinc levels were low. Essential amino acids were present, with threonine and histidine exceeding FAO reference values, whereas methionine+cysteine and phenylalanine+tyrosine were limiting. Vitamin analysis demonstrated very high levels of B-complex vitamins including riboflavin, niacin, pantothenic acid, and thiamine, alongside adequate vitamins A and D. However, folate and vitamin C contents were low.

**Table 1: Selected nutritional composition of *Apis mellifera adansonii* tissue**

| Parameter | Value |
|---|---|
| Crude protein (%) | 30.30±1.86 |
| Crude fat (%) | 9.52±0.74 |
| Energy (kcal/100 g) | 235.24±15.58 |
| Potassium (mg/100 g) | 105793.28±17.64 |
| Calcium (mg/100 g) | 3764.31±12.64 |
| Vitamin B2 (mg/100 g) | 18.2±1.44 |

## CONCLUSION AND RECOMMENDATION(S)

*Nigerian Apis mellifera adansonii* tissue is nutrient-dense, providing high-quality protein, B-complex vitamins, calcium, selenium, and oleic acid. However, the absence of polyunsaturated fatty acids and low iron, zinc, folate, and vitamin C levels indicate the need for dietary complementation. The tissue may serve as a sustainable supplementary food source for improving nutrition and food security in Nigeria.

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**Sub-Theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

# CULINARY FESTIVALS AND FOOD SECURITY PRACTICES IN RIVERS STATE

**BY**

*** Asiegbu, U. A.[1] and Nnawuihe, E. I.[2]**

**[1]Department of Hospitality and Tourism Management, University of Port Harcourt**

**[2]Department of Microbiology, University of Ibadan**

***Corresponding author, e-mail: ucheoma.asiegbu@uniport.edu.ng 08063930840**

**Keywords: Culinary festivals, food production, food supply.**

**Highlights**

- Stable food production was rated good by the community members
- Culinary festivals associated with stable food production.

## BACKGROUND AND OBJECTIVES

Food security has been threatened by a number of factors consequently leading to adverse nutritional and economic outcomes. Culinary festivals as a celebration of culture, community and cuisine could transform food from a basic necessity to a vibrant cultural expression leading to favourable outcomes [1]. Such festivals are entrenched in local heritage providing platforms to preserve and share culinary traditions [2]. They facilitate cultural exchange and mutual understanding. Food security initiatives on the other hand are targeted actions, policies, and programs designed to ensure all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food [3]. This study was designed to examine the relationship between culinary festivals and food security initiatives in Rivers state.

## MATERIALS AND METHODS

A cross-sectional survey involving a mixed method approach was used to collect data from 153 participants, aged 18 years and above residing in Degema and Ikwerre LGAs, Rivers state. The data were sorted and analysed. Food security initiatives were measured using stable food production and stable food supply and categorised as poor (0-5), fair (6-10) and good (11-15) on a 15-point scale. The Pearson correlation was used to test the level of significance ($p = 0.05$) using the Statistical Package for Social Sciences (SPSS) Version 21.

## RESULTS AND DISCUSSION

Table 1 illustrates the categorisation of stable food production and stable food supply. It shows that 62.7% and 70.7% of the participants rated stable food production and supply to be good respectively. While Table 2 shows that culinary festivals positively correlated with stable food production ($r = .387^{**}$) and stable food supply ($r = .377^{**}$).

**Table 1: Categorisation of Stable Food Production and Stable Food Supply**

| Variables Class | Stable Food Production n(%) | Stable Food Production n(%) |
|---|---|---|
| Poor | 9(5.9) | 0(0.0) |
| Fair | 48(31.4) | 45(29.3) |
| Good | 96(62.7) | 108(70.7) |

**Table 2: Correlation between Culinary Festivals, Stable Food Production and Supply**

| Variables | Culinary Festivals | Stable Food Production | Stable Food Supply |
|---|---|---|---|
| **Culinary Festivals** | 1 | .387** | .377** |
| Sig. (2-tailed) | | .000 | .000 |
| **Stable Food Production** | .387** | 1 | .740** |
| Sig. (2-tailed) | .000 | | .000 |
| **Stable Food Supply** | .377** | .740** | 1 |
| Sig. (2-tailed) | .000 | .000 | |

## DISCUSSION

The findings revealed that stable food production and supply were rated good. Culinary Festivals boost stable food production and supply in Rivers state. This means that culinary festivals can enhance food security initiatives in Rivers state and may also favour improved community nutrition especially if the attendant food sources were diverse. This corroborates previous studies that suggested that culinary festivals can lead to favourable outcomes in communities [1,2,4].

## CONCLUSION AND RECOMMENDATIONS

Culinary festivals can enhance food security initiatives in Rivers state. Efforts should ensure successful and regular hosting of culinary festivals encompassing diverse foods in Rivers state.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Effects of Carbohydrate-Rich Pea Fractions in Batter Systems on the Quality of Fried Fish Products.

**Name of Authors**: *Etti, C. J.[1,2] and Annamalai, M.[2]

**Affiliation of Authors**: [1]Department of Agricultural and Food Engineering, University of Uyo, Akwa Ibom State.

[2]College of Engineering, University of Guelph, Ontario, N1G 2W1, Canada

*****Corresponding author, e-mail: cetti@uoguelph.ca, +2349079986921

**Keywords:** Carbohydrate rich fraction of pea (*CRFP*), Coated fried fish, Batter, Valorization.

**Highlights**

- Valorized *CRFP* byproducts as sustainable gluten-free fish batter ingredients.
- *CRFP* particle size affected batter rheology, texture, and oil uptake in frying tests.
- Rheology and frying analyses linked *CRFP* characteristics to fried fish quality.

**BACKGROUND AND OBJECTİVES:**

Growing interest in sustainable and gluten-free batter ingredients has highlighted pea carbohydrate-rich fraction (*CRFP*), a by-product of pea protein extraction, as a promising functional ingredient. This study evaluated the effects of different *CRFP* fractions on batter rheology, pickup efficiency, moisture retention, oil absorption, texture, and color of fried fish. The work also established structural and functional relationships linking *CRFP* composition to product quality, supporting sustainable ingredient utilization and circular food systems through by-product valorization.

**MATERIALS AND METHOD:**

Batter formulations incorporating four varying proportions of *CRFP* were prepared and applied on fish prior to deep-fat frying under controlled conditions. The effects of the four different *CRFP* fractions: >32<53µm, >53<75µm, >75µm and whole *CRFP*; on batter pickup, moisture dynamics, oil absorption, textural integrity, and color attributes of fried products were evaluated and compared with conventional corn-based batter systems. Fried fish with no treatment was also used as the control.

**RESULTS AND DISCUSSION:**

The study demonstrated that *CRFP* particle size significantly affected batter rheology, coating adhesion, moisture retention, oil absorption, texture, and color characteristics of fried products. All batter systems exhibited desirable shear-thinning behavior, while intermediate and coarse fractions improved viscosity and structural stability for coating applications [1–4]. Batter pickup increased with particle size, particularly in the >75 µm fraction, contributing to improved moisture retention and reduced oil uptake during frying. Increasing particle size also reduced hardness, gumminess, and chewiness, resulting in softer and more palatable products. Additionally, *CRFP*-based batters produced acceptable browning characteristics comparable to conventional batter systems, supporting their potential as sustainable gluten-free ingredients.

**CONCLUSION AND RECOMMENDATİONS:**

*CRFP* fractions are promising sustainable batter ingredients for gluten-reduced fried foods. Optimized particle size enhances adhesion, texture, moisture retention, and oil control while supporting by-product valorization. Future research should model heat, moisture, and oil transfer during frying using computational fluid dynamics (CFD) and finite element analysis.

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**Sub-theme**: Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Feasibility of Improved Traditional Processing for Fiber-rich, Odourless Cassava Fufu Flour

**Name of Authors**: *Agugo, U.A[1]., Okwu, G,I[2] and Unekwu J[3]

**Affiliation of Authors:**

[1]Department of Human Nutrition and Dietetics, Federal University of Medical and Health Sciences, Kwale, Delta State
[2]Department of Microbiology, Ambrose Alli University, Ekpoma. Edo State
3Department of Human Nutrition and Dietetics, Ambrose Ali University, Ekpoma, Edo State
Corresponding Author's Email: agugoudodiri@gmail.com
**Keywords**: temperature, fufu, traditional, odourless

**Highlights**

- Controlled fermentation at 35–50 °C minimized foul odour.
- Low-temperature frying reduced moisture and improved storage stability.
- Incorporation of cassava bagasse increased crude fiber and overall yield.

**Background and Objectives of the Study:** Nigeria, the world's largest cassava producer, has strong potential for odourless, fiber-rich fufu flour. Traditional production methods often involve unsafe fermentation practices and yield products with poor shelf life. Previous studies emphasized controlled fermentation and advanced drying equipment (1,2), but these approaches remain inaccessible to rural processors and overlook nutritional concerns of overly refined flour. This study investigates the effect of controlled fermentation temperature and cassava bagasse incorporation on proximate composition, functional properties, consumer acceptability, and storage performance of odourless cassava fufu flour.

**Materials and Methods:** Fresh local cassava roots (six months.) were peeled, washed, and divided into five equal portions (1.5 kg each). Portions were steeped in clean plastic containers at 25 °C (E), 35 °C (A), 40 °C (B), 45 °C (C), and 50 °C (D). Water was changed daily at fermentation onset, with temperatures maintained for 3–10 days. Fermented cassava was mashed, drained, dewatered, and sieved to reduce lumps. Residues (bagasse) and *fufu* were dried at 55 °C with continuous stirring, then blended into flour for homogenization. Final products were packaged in airtight containers for analysis.

**Results and Discussion:** Moisture content (0.44–4.95%) was lower than values reported by Ogungbemi et al. (3). Fiber content was high (5.02–8.39%), while swelling capacity (39.53–246.55 mL/g) and water absorption capacity (2.20–5.04 g/g) aligned with Adebayo-Oyetoro et al. (1). Microbial counts decreased with higher fermentation temperatures, with no growth observed at 45–50 °C at the initial stage. Sensory evaluation showed Sample E (25 °C) had the highest acceptability, though fiber-rich samples were also well-rated.

**Table 1. Summary of the Physical and Chemical Analysis Result**

| Proximate analysis | Sample A (35°C) | Sample B (40°C) | Sample C (45°C) | Sample D (50°C) | Sample E (25°C) | p-value |
|---|---|---|---|---|---|---|
| Moisture (%) | 3.54 ± 0.057 | 3.94 ± 0.064 | 4.95 ± 0.002 | 0.58 ± 0.011 | 0.44 ± 0.014 | 0.000 |
| CF (%) | 8.39 ± 0.461 | 5.02 ± 0.021 | 5.60 ± 0.011 | 5.99 ± 0.001 | 6.44 ± 0.023 | 0.000 |
| Ash (%) | 0.10 ± 0.001 | 0.15 ± 0.001 | 0.09 ± 0.007 | 0.20 ± 0.002 | 0.10 ± 0.002 | 0.000 |
| CP (%) | 12.35 ± 0.35 | 12.27 ± 0.02 | 12.14 ± 0.23 | 11.80 ± 0.14 | 13.72 ± 0.09 | 0.001 |
| **Functional properties** | | | | | | |
| WAC (g/g) | 2.20 ± 0.025 | 5.04 ± 0.035 | 4.40 ± 0.295 | 2.77 ± 0.157 | 3.74 ± 0.057 | 0.000 |
| BD (g/mL) | 0.62 ± 0.192 | 0.89 ± 0.020 | 0.77 ± 0.087 | 0.79 ± 0.215 | 0.52 ± 0.147 | 0.084 |
| SC (mL/g) | 46.10 ± 5.35 | 246.55 ± 51.50 | 229.33 ± 10.07 | 39.33 ± 1.155 | 191.33 ± 8.08 | 0.000 |
| **Microbial (TVC) CFU/g** | | | | | | |
| Bacteria (1) | $8 \times 10^4$ | $5 \times 10^3$ | Few growth | No growth | No growth | |
| Bacterial (T) | $8 \times 10^7$ | $5 \times 10^4$ | $1.4 \times 10^2$ | $1.4 \times 10^2$ | $1 \times 10^2$ | |
| Fungi (I) | No growth | No growth | No growth | No growth | No growth | |
| Fungi (T) | $3 \times 10^7$ | $3 \times 10^5$ | $3 \times 10^2$ | $1.4 \times 10^4$ | $3 \times 10^2$ | |
| **Sensory Parameters** | | | | | | |
| Texture | $6.07^b$ | $5.61^e$ | $6.00^d$ | $6.04^c$ | $7.07^a$ | 0.33 |
| Aroma | $6.36^b$ | $5.79^e$ | $5.86^d$ | $6.26^c$ | $7.07^a$ | 0.43 |
| G/Accept. | $6.43^b$ | $5.93^e$ | $6.11^c$ | $6.07^d$ | $7.21^a$ | 0.23 |

CF-crude fiber; CP- crude protein; WAC= water absorption capacity; BD-bulk density; Swelling capacity; TVC- total viable count; I-initial; T- Terminal

**Conclusion and Recommendation:** Improved traditional processing enhanced fiber content and produced odourless, shelf-stable fufu flour that is easy to reconstitute and culturally acceptable. The method is recommended for household adoption, as required equipment is accessible even in rural settings.

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**Sub-Theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

# Nutritional Value And Sensory Evaluation of Sweet Potato and Its Products

**Olarewaju[1*]C.A., Akinyotu, O.E.,[1] Akinduro, J. P.[1]**

[1]Department of Home Economics, PMB 520,

Adeyemi Federal University of Education, Ondo, Nigeria.

*Correspondence: cecilia_abiodun@yahoo.co.uk, 08036792393

**KEYWORDS: Nutritional Value, Products, Sensory Evaluation, Sweet Potato.**

HIGHLIGHTS- The study determined the products that can be derived from Sweet potato in Ondo West Local Government Area, produced two products from it, determined their nutritional value and sensory evaluation.

Sweet potato (*Ipomoea batatas L.*) is a root vegetable with large, starchy, and sweet-tasting tuber which belongs to the Convolvulaceae family (1). Sweet potato tubers contain macronutrients such as starch, dietary fiber, and protein, in addition to an extensive range of micronutrients, including minerals (manganese, copper, potassium, and iron), vitamins (mainly B complex, and E) and provitamin A (as carotenoids) (3). As food, Sweet potatoes can be processed into different types of food ingredients, such as noodles, biscuits and flour (2). The study investigated the nutritional value and sensory evaluation of sweet potato and its products in Ondo West Local Government Area of Ondo State. Four research questions were generated for the study. Two sweet potato products (potato chips and potato cupcakes) were produced. The research further determined the nutritional value (protein, carbohydrates, fats, vitamin C, beta-carotene and ash content) of the two sweet potato products.

**Methodology**

The study adopted an experimental research design. Primary data for the study were collected with the aid of a laboratory analysis at Federal University of Technology, Akure central laboratory and sensory evaluation from fifteen (15) respondents. The proximate composition of the samples was analyzed using standard methods (AOAC, 2023). A seven - point hedonic scale which comprised of Like Extremely, Like Moderately, Like slightly, Neither Like Nor Dislike, Dislike Slightly, Dislike Moderately, and Dislike Extremely was used for sensory evaluation of the two sweet potato products by (15) fifteen respondents (composed of 5 Lecturers, 5 non-teaching permanent staff and 5 students) and selected through simple random sampling techniques. Simple percentage and mean deviation were used to analyze the data collected.

**Results and Discussion**

The analysis revealed that 18% of the respondents liked extremely the sweet potato cupcake while 17% liked extremely the sweet potato chips. The sweet potato powder had higher carbohydrates (88.07%), protein (4.21%), Vitamin C (13.09mg/100g) and beta carotene (10.24mg/100g) than the chips (75.57%), (2.97%), (9.19 mg/100g) and (3.05mg/100g) respectively. The sweet potato chips contained more ash (2.53%) and fat (12.93%) than the powder (0.48%) and (0.84%) respectively. The overall acceptability of the findings revealed that 82% of the respondents liked extremely the Sweet potato chips while only12% of the respondents liked slightly the Sweet potato chips. These findings affirm that different sweet potato products vary in their nutritional value and consumer preference, with sweet potato powder having higher carbohydrate content and sweet potato chips showing greater consumer acceptability. This is line with findings that sweet potato has a high nutritional value because it is rich in carbohydrates, dietary fiber,

vitamins, minerals, and bioactive compounds such as B-carotene (5). In addition, consumer preference studies have shown that nutritional quality, taste, color, texture, and health benefits significantly influence consumer's acceptance and demand for sweet potato products (4).

**Conclusion**

The study concluded that sweet potato powder is a richer source of carbohydrates than sweet potato chips. Despite this difference in nutritional composition, the sweet potato chips were well accepted by consumers, indicating that they possess desirable sensory qualities and have good potential for consumption and market acceptance. Nutrition education and product development programs should be implemented to promote the use of sweet potato powder as a nutritious ingredient in households and food industries. Additionally, efforts should be made to improve sensory qualities and diversify the applications of sweet potato powder in foods such as baked products and complementary foods to enhance consumer acceptance.

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**Theme/Sub-theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, and Sectors / Transforming Local Food Systems for Improved Food Security and Nutrition.

**Title:** Nutritional Quality, Functional Properties, and Sensory Acceptability of Complementary Food Porridge Blends Formulated from Fermented Millet, Pigeon Pea, and Carrot Flour.

**Igbokwe, Amarachi C[1]., *Igbokwe, Kosisochukwu C.[2]**

[1]Department of Food Science and Technology, Enugu State University of Science and Technology, Enugu State, Nigeria.

[2]Department of Nutrition and Dietetics, Federal University of Agriculture Mubi, Adamawa State, Nigeria. kosidinma05@gmail.com, +2348160459937.

**Keywords:** Complementary food; millet; pigeon pea; malnutrition

- **Highlights:**
- Fermented millet–pigeon pea–carrot blends improved protein (19.11–21.80%) and dietary fiber.
- Lysine and essential amino acid content improved with pigeon pea substitution, correcting cereal deficiency.

## BACKGROUND AND OBJECTIVES

Protein-energy malnutrition and micronutrient deficiencies remain a major public health burden among infants and young children aged 6–24 months in Nigeria and sub-Saharan Africa. Traditional cereal-based porridges are frequently deficient in essential amino acids and micronutrients (1). This study aimed to formulate and evaluate complementary food porridge blends from fermented millet, fermented pigeon pea, and carrot flour, with a view to providing an evidence base for improving infant feeding in Nigeria.

## MATERIALS AND METHOD

Millet and pigeon pea were fermented (48 h and 72 h; 28°C; 1:3 w/v), oven-dried (60°C, 12 h), milled, and sieved (250 µm). Carrot flour was produced by blanching, drying (50°C, 12 h), milling, and sieving. Five blends were formulated sample A: 100:0:0; B: 90:5:5; C: 80:15:5; D: 70:25:5; E: 60:35:5 (millet: pigeon pea: carrot, %). Proximate composition, mineral, vitamin, amino acids, and functional properties were determined by standard methods. Sensory evaluation was conducted using trained panelists and a nine-point hedonic scale. Data were analyzed using one-way ANOVA with Duncan's Multiple Range Test at $p < 0.05$ (SPSS v25).

## RESULTS AND DISCUSSION

Protein increased significantly ($p < 0.05$) from 19.11% (A) to 21.80% (E), exceeding the minimum 10% recommended for infant complementary foods (2), while moisture decreased (10.25-8.82%) and fiber increased (1.80-3.50%) with pigeon pea inclusion. Calcium (0.21-0.52 mg/100g), magnesium (0.13-0.33 mg/100g), and iron (highest 0.56 mg/100g in Sample B) improved with legume addition; zinc declined slightly at higher pigeon pea levels, likely due to elevated phytate. Lysine increased from 4.45 to 5.03 mg/100g, confirming amino acid complementarity between millet and pigeon pea (3). Vitamins A, C, D, and B6 declined significantly ($p<0.05$) with increasing pigeon pea substitution, likely due to heat-induced losses during drying and milling. Functional properties - bulk density (0.81-0.89 g/ml), water and oil absorption were appropriate for reconstituted infant porridge. Sensory scores were favorable across all samples (>7.72 on all attributes); Sample B (90:5:5) achieved the highest overall acceptability (OA 8.33), aroma (8.33), and consistency (8.44), consistent with the literature on cereal-legume complementary foods (4).

## CONCLUSION AND RECOMMENDATION(S)

Complementary food porridge blends formulated from fermented millet, pigeon pea, and carrot flour demonstrated significantly improved protein content, mineral density, and essential amino acid balance compared to the millet-only control, with all blends exceeding the WHO minimum protein threshold for infant complementary foods. Sample B (90:5:5) achieved the best combination of nutritional quality and sensory acceptability. These locally sourced, low-cost blends represent a practical and sustainable approach to addressing protein-energy malnutrition and micronutrient gaps in infants aged 6–24 months in Nigeria. It is recommended that future studies assess in vivo nutrient bioavailability, anti-nutritional factor content, and microbiological safety.

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Theme/sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition

**Title: Evaluation of Mineral and Vitamin Compositions of Underutilized Seeds as An Alternative Functional Food**

***Sanda, F. A[1]., Abba, A[1]., Chamba, G[1]., Hassan, M. A[1]., Mohammed., H. M[2]. Petrol, B. B[1]., Kyari, S. M. and Sheriff, M.**

[1]Department of Biochemistry, University of Maiduguri; Borno State,n Nigeria

[2]Department of Biochemistry, Kashim Ibrahim University, Borno State, Nigeria

***Corresponding author Email: fabbasanda6000@gmail.com.+2347068786627**

***Keywords: Melon, curcubeta, adonsonia, cyperus***

**Highlights**

- Addressing hidden hunger with local resources:
- Strong micronutrient profile validates functional potential

**BACKGROUND AND OBJECTIVES** Micronutrient deficiencies remain a major public health challenge in developing countries, contributing to malnutrition, impaired immune function, stunted growth, and increased disease susceptibility. [1]. This study aimed to investigate the nutritional composition of selected underutilized seeds such as pumpkin, melon baobab, and date seeds, and nuts such as tiger nut.

**MATERIALS AND METHODS**: Mature and healthy samples were purchased from local markets and farms, cleaned, oven-dried at 50–60°C, roasted at 120–140°C, milled, and sieved to fine flour. Proximate, mineral, and vitamin analyses were performed using standard AOAC [2].

**RESULTS AND DISCUSSION:** Mineral analysis revealed appreciable levels of Ca (453.47 mg/100g) for S2, Mg (142.6 mg/100g), for S1. These densities align with [ 1], who reported that pumpkin, sesame, and Blend S3 had recorded higher value of B1(0.53 mg/100g), while S1 had 0.64 mg/100g of B2. S2 had 0.46 mg/100g as B6, while B9did not show significant (P>0.05) difference between Raw, S2 and S3/ These vitamin levels match those reported by for nutrient-dense seeds, supporting antioxidant activity and energy metabolism [3].

**Table 1. Mineral Composition of the Formulated Products (mg/100 g)**

| Sample | Ca (mg/100 g) | Mg (mg/100 g) | Fe (mg/100 g) | Zn (mg/100 g) | Na (mg/100 g) |
|---|---|---|---|---|---|
| **Raw** | 343.15 ± 0.01$^{d}$ | 125.25 ± 0.01$^{d}$ | 7.21 ± 0.01$^{d}$ | 3.15 ± 0.01$^{d}$ | 51.44 ± 0.01$^{d}$ |
| **S1** | 386.15 ± 0.01$^{c}$ | 142.80 ± 0.01$^{c}$ | 10.25 ± 0.01$^{c}$ | 4.02 ± 0.01$^{c}$ | 58.37 ± 0.01$^{c}$ |
| **S2** | 453.47 ± 0.01$^{a}$ | 222.41 ± 0.01$^{b}$ | 12.22 ± 0.01$^{b}$ | 4.66 ± 0.01$^{b}$ | 60.48 ± 0.01$^{b}$ |
| **S3** | 417.97 ± 0.01$^{a}$ | 276.75 ± 0.01$^{a}$ | 14.32 ± 0.01$^{a}$ | 6.12 ± 0.01$^{a}$ | 87.33 ± 0.01$^{a}$ |

Values are presented as mean ± SEM (n = 3). Values in the same column with different superscripts differ significantly ($P < 0.05$).

Key:
Raw = 20% pumpkin seed, 20% baobab seed, 20% melon seed, 20% tiger nut, 20% date seed.
S1 = 50% pumpkin seed, 20% baobab seed, 10% melon seed, 10% tiger nut, 10% date seed.
S2 = 60% pumpkin seed, 20% baobab seed, 10% melon seed, 5% tiger nut, 5% date seed.
S3 = 40% pumpkin seed, 20% baobab seed, 15% melon seed, 15% tiger nut, 10% date seed.

**Table 4.2: Vitamin Composition of the Formulated Products (mg/100 g)**

| Sample | B1 (mg/100 g) | B2 (mg/100 g) | B6 (mg/100 g) | B9 (mg/100 g) | B12 (mg/100 g) |
|---|---|---|---|---|---|
| **Raw** | $0.23 \pm 0.01^{d}$ | $0.43 \pm 0.01^{b}$ | $0.33 \pm 0.01^{a}$ | $0.34 \pm 0.01^{a}$ | ND |
| **S1** | $0.37 \pm 0.01^{c}$ | $0.64 \pm 0.01^{a}$ | $0.35 \pm 0.01^{b}$ | $0.33 \pm 0.01^{b}$ | ND |
| **S2** | $0.47 \pm 0.01^{b}$ | $0.32 \pm 0.01^{c}$ | $0.46 \pm 0.01^{a}$ | $0.07 \pm 0.01^{a}$ | ND |
| **S3** | $0.53 \pm 0.01^{a}$ | $0.34 \pm 0.01^{c}$ | $0.44 \pm 0.01^{a}$ | $0.06 \pm 0.01^{a}$ | ND |

Values are presented as mean ± SEM (n = 3). Values in the same column with different superscripts differ significantly ($P < 0.05$).

ND = Not Detected.

Key (Table 2):

Raw = 20% pumpkin seed, 20% baobab seed, 20% melon seed, 20% tiger nut, 20% date seed.

S1 = 50% pumpkin seed, 20% baobab seed, 10% melon seed, 10% tiger nut, 10% date seed.

S2 = 60% pumpkin seed, 20% baobab seed, 10% melon seed, 5% tiger nut, 5% date seed.

S3 = 40% pumpkin seed, 20% baobab seed, 15% melon seed, 15% tiger nut, 10% date seed.

**Conclusion and Recommendations:** The blends provide appreciable levels of calcium, magnesium, potassium, zinc, and vitamins A, E, B1, and B2, confirming its potential to help address key micronutrient deficiencies in vulnerable populations. Fortification of staple foods and nutrition programs with this seed/nut blend is recommended to improve mineral and vitamin intake.

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**Theme/sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title: Production and Evaluation of Nutritional and Antinutritional Factors of Wheat- based Bread Fortified with Soybeans Flour**

**Name of Author(s) Petrol, B.B[1]., Solomon, D[1]., Chamba, G[1]., Sanda, F. A[1]., Kyari, S. M.[1] and Sheriff, M[1].**

**Affiliation of author(s)**[1]Department of Biochemistry, Faculty of Life Sciences, University of Maiduguri, Borno State, Nigeria

***Corresponding author Email: bintubukar@yahoo.com**

***Keywords: Bread, soybean, micronutrients, antinutrients***

**Highlights**

- Soybean flour fortification significantly improved mineral content of bread.
- Higher soybean inclusion increased antinutritional factors.

**BACKGROUND AND OBJECTIVES:** Bread is one of the most widely consumed staple foods globally, valued for its convenience, affordability, and palatability [1]. In Nigeria, bread is consumed daily across all socioeconomic classes, with demand remaining steady despite price hikes as consumers view it as a complete meal and coping mechanism amid food inflation [2]. Bread is a major staple in Nigeria with steady demand despite inflation, yet most commercial wheat bread is low in essential micronutrients like calcium, iron, and potassium. Protein-energy and micronutrient malnutrition remain prevalent, especially among low-income groups who rely heavily on bread as a primary food source.

**MATERIALS AND METHODS**: Wheat flour, soybean, and other ingredients were procured from Maiduguri Monday market, Borno State, Nigeria. Three bread formulations were prepared: 100% wheat flour (control), 80:20 wheat-soybean, and 70:30 wheat-soybean flour blends. Mineral and antinutritional contents were analyzed using standard AOAC methods [3].

**RESULTS AND DISCUSSION:** Soy fortification significantly increased Calcium (242%), Iron (148%), and Potassium (242%) in bread, but also raised phytate (20%) and tannin (19%) levels in the 30% formulation ($p < 0.05$). Processing methods such as soaking, germination, and fermentation reduce but do not eliminate phytates and tannins. Residual antinutrients persist even under optimized conditions [ 4].

**Table 1: Mineral Element Composition of Composite Breads**

| Bread formulation | Calcium (Ca) | Iron (Fe) | Potassium (K) | Magnesium (Mg) | Phosphorous (P) |
|---|---|---|---|---|---|
| W | 18.5±0.9$^{c}$ | 2.1±0.2c | 128.4±5.3$^{c}$ | 32.7±1.4$^{c}$ | 128.9±6.1$^{c}$ |
| Ws1 | 46.8±1.8$^{b}$ | 3.8±0.3$^{b}$ | 312.6±8.7$^{b}$ | 78.5±2.5$^{b}$ | 289.4±9.8$^{b}$ |
| Ws2 | 63.3±2.5$^{a}$ | 5.2±0.4$^{a}$ | 438.9±10.5$^{a}$ | 108.3±3.8$^{a}$ | 397.6±11.2$^{a}$ |

Values are presented as mean ± S.E.M, n=3. Values with different superscript a,b, and c in the column are significantly difference.($P<0.05$)

**Key:** W = 100% wheat flour (Control) Ws1 = 80% wheat flour and 20% soybeans flour

Ws2 = 70% wheat flour and 30% soybeans flour

**Table 4.2: Antinutritional Factors (ANFs) in Composite Breads**

| Bread formulation | Phytate content (Mg/100g Dw) | Tannin content (Mg TAE/100g Dw) | Oxalate content (Mg/100g Dw) |
|---|---|---|---|
| W 100% (control) | 235.6±6.8$^{c}$ | 38.2±1.5$^{c}$ | 16.8±0.7$^{c}$ |
| Ws1: 80%:20% | 247.3±9.5$^{b}$ | 44.1±2.2$^{b}$ | 25.9±1.1$^{b}$ |
| Ws2: 70%:30% | 255.3±11.7$^{a}$ | 53.7±2.97$^{a}$ | 33.1±1.4$^{a}$ |

Values are presented as mean ± S.E.M, n=3. Values with different superscript a, b, and c in the column are significantly difference (P<0.05).

**Key:** W = 100% wheat flour (ControWs1 = 80% wheat flour and 20% soybeans flour

Ws2 = 70% wheat flour and 30% soybeans flour

**Conclusion and Recommendations:** Soybean flour fortification improved bread mineral content, with 80:20 wheat-soy identified as the practical limit for unmodified soy flour. Processing techniques like fermentation or germination should be applied to reduce antinutritional factors at higher fortification levels.

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*Theme/Sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition*

# Utilization of Local Grains for the Production of Composite Bread: A Strategy for Improving Food Security and Nutrition in Nigeria

***Auwal, A.I.**[1] and ***Hussain, B.M.**[2]

[1]*Department of Home Economics, Yusuf Maitama Sule Federal University of Education, Kano, Nigeria*

[2]*Department of Public Health, National Open University of Nigeria*

*Corresponding author, e-mail: aysher042@gmail.com, Tel: +2347035780194

**Keywords:** *Composite flour; Local grains; Sorghum; Bread*

## Highlights

- Local grain composite bread showed acceptable consumer preference
- 70:30 wheat-local grain blend recorded highest composite bread acceptance
- Local grains provide value addition and diversify Nigeria's cereal food system

## Background and Objectives

Food insecurity and inadequate dietary diversity remain major challenges in Nigeria despite the availability of indigenous cereals such as sorghum, millet and maize [4]. Bread is widely consumed across different socioeconomic groups but relies largely on imported wheat flour, creating a need to explore alternative locally available raw materials. The use of composite flour technology provides an opportunity to increase local cereal utilization, improve food system resilience and promote value addition. [1]. Sorghum and millet are important cereal grains with nutritional and functional properties that make them suitable for incorporation into different food products [2]. This study aimed to develop bread using wheat flour partially substituted with sorghum, millet and maize flour and evaluate the sensory acceptability of the resulting composite bread products.

## Materials and Methods

An experimental design was used to produce bread from wheat flour and composite flour blends containing sorghum, millet and maize. A 100% wheat flour bread served as the control, while composite breads were produced by replacing wheat flour with local grain flour at 30%, 40% and 50% substitution levels, corresponding to wheat-to-local-grain ratios of 70:30, 60:40 and 50:50, respectively. All bread samples were prepared using standard bread-making procedures under similar processing conditions.

Sensory evaluation was conducted by a consumer panel using a nine-point hedonic scale to assess taste, texture, aroma, crust colour and overall acceptability. Data were expressed as mean ± standard deviation and analysed using one-way Analysis of Variance (ANOVA). Significant differences among sample means were separated using Tukey's Honestly Significant Difference test at $p<0.05$.

## Results and Discussion

Sensory evaluation showed that all bread samples were acceptable to consumers. Significant differences ($p<0.05$) were observed among formulations for sensory attributes. The control bread recorded the highest overall acceptability score (8.6 ± 0.3). Among the composite bread samples, the 70:30 blend recorded the highest overall acceptability (8.2 ± 0.4), followed by the 60:40 blend (7.7 ± 0.4), while the 50:50 blend recorded the lowest score (7.0 ± 0.6).

**Table 1: Sensory evaluation scores of composite bread samples**

| Sensory attribute | 100:0 (Control) | 70:30 | 60:40 | 50:50 |
|---|---|---|---|---|
| **Taste** | 8.5 ± 0.3 | 8.1 ± 0.4 | 7.6 ± 0.5 | 7.0 ± 0.6 |
| **Texture** | 8.7 ± 0.2 | 8.3 ± 0.3 | 7.8 ± 0.4 | 7.2 ± 0.5 |
| **Aroma** | 8.4 ± 0.4 | 8.0 ± 0.3 | 7.5 ± 0.5 | 6.9 ± 0.6 |
| **Crust colour** | 8.6 ± 0.3 | 8.2 ± 0.4 | 7.7 ± 0.3 | 7.1 ± 0.5 |
| **Overall acceptability** | **8.6 ± 0.3** | **8.2 ± 0.4** | **7.7 ± 0.4** | **7.0 ± 0.6** |

The findings indicate that moderate substitution of wheat flour with sorghum, millet and maize can maintain desirable sensory qualities while improving the utilization of locally available cereals. This finding is supported by previous research showing that bread acceptability can be influenced by the proportion of local cereal flour incorporated into wheat-based formulations [3]. Recent research on wheat, millet and sorghum composite bread also demonstrated that cereal substitution affects bread volume, colour, texture and sensory characteristics, emphasizing the importance of selecting appropriate substitution levels [5]. The 70:30 blend showed the greatest potential for consumer acceptance, suggesting that composite flour technology may support diversification of Nigeria's cereal-based food system.

**Conclusion and Recommendations**

Composite bread developed from wheat flour partially substituted with sorghum, millet and maize was acceptable to consumers. The 70:30 and 60:40 blends demonstrated favourable sensory characteristics, indicating potential for local grain utilization in bread production. Further studies should evaluate nutritional composition, micronutrient contribution, shelf stability and production cost to establish broader food security and nutrition benefits.

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**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Income, Living Arrangements, and Family Support as Predictors of Household Food Security among the Elderly in Ibadan, Oyo State, Nigeria.**

*SODIQ, A. O.[1], and Bodunde, I. O. [2]

Department of Human Nutrition and Dietetics, Lead City University, Ibadan, Oyo State, Nigeria. omoladeaishah@gmail.com, +234 9033614657

**Keywords:** Elderly, Household Food Security, Nutritional Status, Socioeconomic Status

**Highlights:**
1. Two of five elderly lack resources to eat a varied diet.
2. More than half of the elderly were food insecure.
3. High income was the strongest predictor of household food security.

**BACKGROUND AND OBJECTIVES:** Food insecurity among the elderly is a growing public health concern in Nigeria, driven by demographic ageing, deteriorating economic conditions, and weakening social support systems. [1] These challenges combined with rising food prices and high levels of chronic disease expose older adults to nutritional risk, yet there remains limited data on how socioeconomic and demographic factors shape food security and nutritional status among elderly individuals in Ibadan. This study assessed the socioeconomic and socio-demographic predictors of household food security among elderly individuals in Ibadan, Oyo State, Nigeria.

**MATERIALS AND METHOD:** A cross-sectional study design was employed to recruit 300 elderly (≥ 60 years) using multistage sampling technique. A structured questionnaire was used to obtain data on respondents' socio-economic and demographic characteristics, household food security status and anthropometric measurements. Data were analyzed using IBM SPSS Statistics version 25. Multivariate binary logistic regression was performed to identify independent predictors of household food security. Ethical approval for the study was obtained from Lead City University Research Ethics Committee

**RESULTS:**
The mean age of the elderly was 72.13 ± 9.709 years, with 59.7 % being females and 40.3% males. 30.7% of respondents were food secure, while 69.3% were food insecure. Majority of the respondents (61.7%) had medium socioeconomic access, 37.7% had low socioeconomic access and 0.7% had high socioeconomic access. Six variables emerged as statistically significant independent predictors of household food security in the adjusted model. High income was the strongest predictor (AOR = 37.635, 95% CI: 5.960–237.660, $p < 0.001$), with high-income elderly being approximately 37.6 times more likely to be food secure than low-income counterparts. The dominance of income as a predictor of food security is consistent with Sen's (1981) entitlement theory, which position socioeconomic access as the fundamental mechanism of food acquisition [2]. These findings also validate evidence from a study that identified income as the primary determinant of food security among Nigerian Households [3].

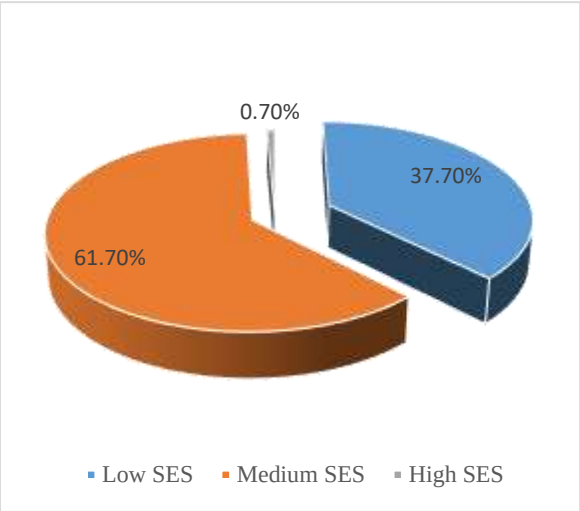



Fig 1: Socioeconomic Access

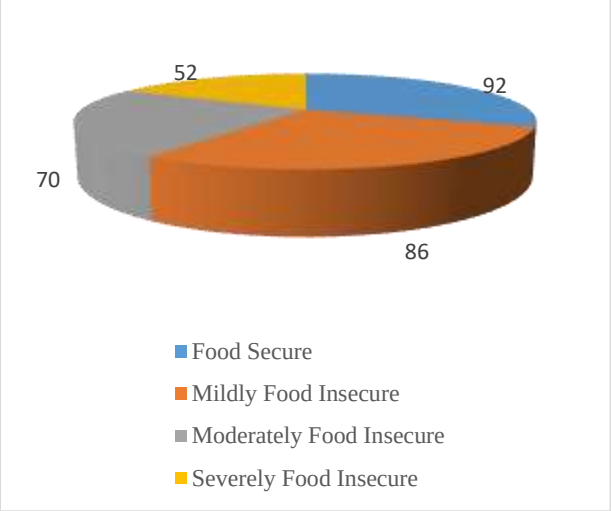



Fig 2: Household Food Security

Table 2: Significant Predictors of Household Food Security

| Predictor Variable | AOR | 95% CI (Lower – Upper) | P-value |
|---|---|---|---|
| High income (vs. low income) | **37.635** | **5.960 – 237.660** | **< 0.001** |
| Lives with spouse only (vs. alone) | 5.778 | 1.049 – 31.834 | 0.044 |
| Lives with children/other relatives (vs. alone) | 3.752 | 1.030 – 13.666 | 0.045 |
| Trading/family support/farming (vs. salary/pension) | 2.226 | 1.003 – 4.942 | 0.049 |
| Age ≥85 years (vs. 60–74 years) | 0.288 | 0.099 – 0.837 | 0.022 |
| Having 1 child only (vs. no children) | 0.061 | 0.004 – 0.884 | 0.040 |

*AOR = Adjusted Odds Ratio; CI = Confidence Interval. Bold values indicate the strongest predictor.*

**CONCLUSION AND RECOMMENDATION:** Household food security among the elderly in Ibadan is primarily determined by income adequacy, source of income, and living arrangements, with the oldest-old (≥85 years) and those living alone representing the most vulnerable subgroups. These findings highlight the urgent need for expanded social pension coverage, support for elderly engaged in informal economic activities, and community-based interventions targeting socially isolated elderly individuals.

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THEME/SUB-THEME: Transforming Local Food Systems for Improved Food Security and Nutrition
TITLE: Nutrient Composition and Functional Properties of Complementary Food Made from Blend of Barley (Hordeum vulgare), Crayfish (Procambarus clarkii) and Soybean (Glycine max)
AUTHOR: Sani,B.U.1

AFFILIATION: 1 Department of Biochemistry, Bayero University Kano, Kano State, Nigeria
CorrespondingAuthor:BashirUmar Sani
Email:bashirumarsani0@gmail.com
Phone:+2347032398501

KEYWORDS:
Complementary food, Barley, Soybean, Crayfish

HIGHLIGHTS
• Barley-soybean-crayfish blend improved protein and mineral contents
• F2 formulation showed highest sensory acceptability among blends
• Local ingredients produced nutrient-dense complementary food

BACKGROUND AND OBJECTIVES
Appropriate complementary feeding is essential for preventing malnutrition among infants after six months of age when breast milk alone can no longer meet nutrient requirements. Commercial complementary foods are often expensive and unaffordable for many low-income households in Nigeria. This study aimed to determine the nutrient composition and functional properties of complementary foods formulated from blends of barley, soybean, and crayfish using locally available ingredients.

**MATERIALS AND METHODS**
Three complementary food formulations were prepared using barley, soybean, and crayfish in different proportions: F1 (60:20:20), F2 (70:15:15), and F3 (80:10:10). Samples were analyzed for proximate composition, mineral and vitamin contents, amino acid profile, fatty acid composition, anti-nutritional factors, and functional properties using standard analytical methods. Sensory evaluation was conducted using a panel of assessors.

**RESULTS AND DISCUSSION**
Protein content ranged from 13.67% to 21.67%, while fat content ranged from 3.42% to 7.85%. Energy values ranged between 327.79 and 381.45 kcal/100 g. The formulations contained appreciable levels of essential minerals, including calcium, iron, and potassium. Major fatty acids identified were palmitic, oleic, linoleic, and palmitoleic acids. Functional properties and low anti-nutritional factors confirmed suitability for infant feeding. Sensory evaluation showed significant differences among formulations, with F2 (70% barley, 15% soybean, and 15% crayfish) receiving the highest overall acceptability score.

**CONCLUSION AND RECOMMENDATION(S)**
Complementary foods produced from barley, soybean, and crayfish possess good nutritional quality, favourable functional characteristics, and acceptable sensory properties. The F2 formulation was identified as the most suitable blend. Promotion of this formulation could contribute to reducing childhood malnutrition and improving complementary feeding practices in Nigeria. Further studies involving biological evaluation and shelf-life assessment are recommended.

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**Theme/sub-themes: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title**:Harnessing Indigenous Multigrain Foods for Better Nutrition: Evidence from the Proximate Composition and Sensory Evaluation of Indigenous Sabaya Obtained from Local Producers in Kano State.

**Abubakar, S.I[1]** and Inuwa, F.N[2]

Affiliation: ^1 Department of Nutrition and Dietetics, Bayero University Kano, Kano State, Nigeria
[1]Nutrition unit, Department of Biochemistry Faculty of Basic medical science Bayero University Kano
[2]Nutrition unit, Department of Biochemistry Faculty of Basic medical science Bayero University Kano
*Corresponding Author: e-mail: asismail.bch@buk.edu.ng, Phone:+2348068869030
**Keywords**: Sabaya, Multigrain Foods, Better Nutrition, Proximate Composition

## HIGHLIGHTS

- Sabaya contained appreciable amounts of protein, fiber and energy yielding nutrients.
- All evaluated samples showed good consumer acceptability.
- Indigenous multigrain foods can support efforts toward better nutrition.

## BACKGROUND AND OBJECTIVES

Delivering better nutrition for all requires increased utilization of nutritious, affordable, and culturally acceptable indigenous foods. In Nigeria, locally prepared multigrain foods such as Sabaya are widely consumed and have the potential to contribute to dietary diversity and improved nutrient intake. However, limited scientific evidence exists regarding their nutritional quality and consumer sensory acceptability of the prepared food made from the Sabaya powder. The objective of this study was to evaluate the proximate composition and sensory characteristics of locally produced Sabaya obtained from selected producers in Kano State and to compare the nutritional quality and consumer acceptability of samples from different producers.

## MATERIALS AND METHODS

Three samples of Sabaya were obtained from local producers in Kano State. Proximate composition, including moisture, ash, crude protein, crude fat, crude fiber, and carbohydrate contents, was determined using standard AOAC methods. Sensory evaluation was conducted using a 9-point hedonic scale among fifteen semi-trained panelists who assessed color, aroma, taste, texture, and overall acceptability. Data were analyzed using one-way ANOVA at a significance level of $p < 0.05$.

## RESULTS AND DISCUSSION

**Table 1: Proximate Composition of formulated multigrain powder (sabaya)**

| Samples | Moisture (%) | Ash (%) | Protein (%) | Fat (%) | Fiber (%) | Carbohydrate (%) |
|---|---|---|---|---|---|---|
| A | $1.84 \pm 0.05^{c}$ | $0.86 \pm 0.05^{c}$ | $4.24 \pm 0.11^{b}$ | $12.25 \pm 0.49^{b}$ | $35.26 \pm 0.92^{b}$ | $45.55 \pm 0.95^{a}$ |
| B | $5.40 \pm 0.02^{b}$ | $12.32 \pm 0.07^{a}$ | $7.93 \pm 0.02^{a}$ | $14.43 \pm 0.79^{a}$ | $37.36 \pm 0.84^{a}$ | $22.56 \pm 0.77^{c}$ |
| C | $6.84 \pm 0.15^{a}$ | $2.02 \pm 0.04^{b}$ | $8.59 \pm 0.04^{a}$ | $12.60 \pm 0.15^{b}$ | $35.67 \pm 0.39^{b}$ | $34.28 \pm 0.63^{b}$ |

Samples A, B and C represented Sabaya obtained from three different local producers in Kano State, Sample C had the highest protein content (8.59%), while Sample B contained the highest fiber (37.36%), ash (12.32%) and fat (14.43%). Sample B may therefore offer better nutritional value because of its higher protein, fiber and mineral content, although all three samples showed similar sensory acceptability ($p > 0.05$). The observed differences are likely attributable to variations in ingredient composition and traditional processing methods used by the different producers. The relatively high fiber levels indicate the potential of Sabaya to support healthy dietary patterns. Moisture contents were low, suggesting good storage stability.

Sensory evaluation revealed favorable consumer responses, with mean scores ranging from 6.80 to 7.67 across evaluated attributes. No significant differences ($p > 0.05$) were observed among the samples for color, aroma, taste, texture, and overall acceptability.

## CONCLUSION AND RECOMMENDATIONS

Among the evaluated samples, Sample B demonstrated the most favorable overall nutritional profile because of its higher fiber, ash and fat contents together with high protein content, while Sample C recorded the highest protein level. All samples were similarly acceptable to consumers. The findings suggest that locally produced Sabaya has good nutritional potential. Future studies should develop and scientifically standardize the formulation and processing of Sabaya and evaluate its micronutrient composition.

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| | |
|---|---|
| **Theme/sub-theme:** | Transforming Local Food Systems for Improved Food Security and Nutrition |
| **Title:** | Food Insecurity and Coping Strategies among Adult Women in Ogun State |
| **Name of Authors:** | *Faleti, O.E., Akinbode, N.A., Odebo, G.P., Oladoyinbo, C.A. |
| **Affiliation of Authors:** | Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta. |
| | *Corresponding author, oyindamolafaleti190@gmail.com, +2349037965874 |
| **Keywords:** | Food Insecurity, Coping Strategies, Adult Women |

**Highlights**

- Food insecurity affected about nine out of every ten women.
- Mild coping strategies were the most commonly adopted.
- Income, marital status and family structure influenced food insecurity.


**BACKGROUND AND OBJECTIVES**

Food insecurity remains a public health challenge in Nigeria [1], and women play an important role in household food management. Information on food insecurity among adult women in Ogun State is limited. This study assessed food insecurity and coping strategies among adult women in Ogun State.

**MATERIALS AND METHODS**

A cross-sectional study was conducted among 654 adult women aged 18-59 years selected using a multistage sampling technique. Data were collected using an interviewer-administered questionnaire. Food insecurity and coping strategies were assessed using Household Food Insecurity Access Scale (HFIAS) and Coping Strategy Index (CSI) respectively. Anthropometric measurements, including weight, height, waist circumference and hip circumference were also taken. Data were analyzed using the Statistical Package for Social Sciences (SPSS version 25). Descriptive statistics including frequencies, percentages, means and standard deviations were used to summarize the data, while Chi-square test was used to determine associations between variables. Statistical significance was set at $p<0.05$.

**RESULTS AND DISCUSSION**

The mean age was 37.54±10.44 years. Only a few (12.8%) of the respondents were food secure while 37.9%, 36.5% and 12.7% were mildly, moderately and severely food insecure respectively. Most of the respondents (86.2%) adopted mild coping strategies, whereas 9.2% and 4.6% adopted moderate and high coping strategies respectively. About half (50.3%) of the respondents had normal weight, 27.2% were overweight, 14.8% were obese and 7.6% were underweight. Food insecurity was significantly associated with marital status ($p<0.001$), family structure ($p=0.010$) and monthly income ($p<0.001$). Coping strategy was significantly associated with marital status ($p=0.047$), occupation ($p=0.041$), educational status ($p<0.001$) and food insecurity status ($p<0.001$).

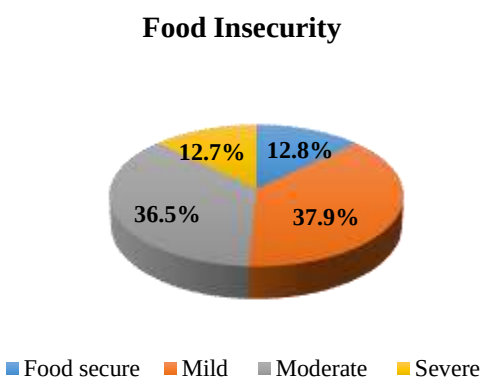



**Figure 1: Food insecurity status**

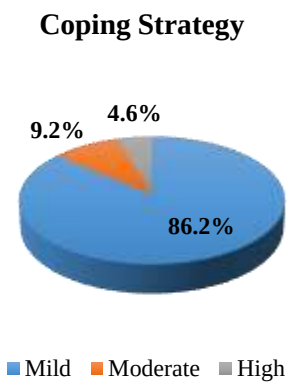



**Figure 2: Coping strategy level**

The findings show that food insecurity remains common among adult women in Ogun State. Most respondents adopted mild coping strategies, suggesting that households try to adjust their food consumption before resorting to more severe measures. Similar observations have been reported by Akinbule *et al*., who found a high prevalence of food insecurity among households in Ogun State [2]. Low income, rising food prices and the use of coping strategies such as borrowing food and consuming less preferred foods have also been reported among women [3].

## CONCLUSION AND RECOMMENDATIONS

Food insecurity was prevalent among adult women in Ogun State and was influenced by selected socio-demographic and socioeconomic factors. Government and relevant agencies should introduce programmes that improve women's sources of income, strengthen nutrition education and make nutritious food more accessible to help reduce food insecurity.

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**THEME:** Transforming Local Food Systems for Improved Food Security and Nutrition

**SUB-THEME:** Sustainable Food Innovation and Indigenous Food Resources for Improved Child Nutrition

**TITLE:** Harnessing Indigenous Food Resources for Sustainable Complementary Feeding: Nutritional Evaluation of Sorghum–Edible Insect–Pumpkin Leaf Composite Flour

**NAME OF AUTHOR:** Omolewa, P.O.[1] and Olaitan, O.O[2]

**AFFILIATION:** [1]Department of Nutrition and Dietetics, Wesley University, Ondo, Ondo State, Nigeria, and [2]Bowen University, Iwo, Osun State, Nigeria.

**Email and Phone Number:** patienceodun2017@gmail.com, +2348161825094

**KEYWORDS:** Complementary food, Sorghum, Mopane worm, Pumpkin leaf

## HIGHLIGHTS

- Protein content of the fortified blends increased significantly from 12.78% to 21.39%.
- Mineral composition, especially phosphorus, potassium, calcium, iron, and zinc improved markedly.
- Pumpkin leaf fortification contributed to increased vitamin A content in the formulated blends.
- The study demonstrates the role of indigenous foods in improving child nutrition and food security.

## BACKGROUND AND OBJECTIVES

In many low socioeconomic households, use of complementary foods made from single cereal food contribute to protein-energy malnutrition and micronutrient deficit experienced by infants and young children in developing countries [1]. However, using various locally available, nutrient-rich, and underutilized food resources can promote dietary diversity, diet quality, food security and culturally acceptable foods, growth and development of the children [2]. Sorghum (*Bicolor L. monarch*) is a staple cereal widely consumed in Nigeria. Mopane worm (*Gonimbrasia belina*) is a rich source of protein, minerals and bioactive compounds, while fluted pumpkin leaf (*Telfairia occidentalis*) contains essential vitamins and micronutrients [3]. This study evaluated the proximate and micronutrient composition of complementary foods developed from fermented sorghum mixed with edible mopane worm and fluted pumpkin leaf.

## MATERIALS AND METHODS

An experimental study design was adopted. Fermented sorghum flour, mopane worm flour, and pumpkin leaf powder were prepared using standard processing methods, and mixed. Four formulations were produced: SPA (100% sorghum), PSA (80:10:10), PAS (80:15:5), and ASP (80:5:15). Proximate composition, mineral content (calcium, iron, zinc, phosphorus, and potassium), and vitamin content (A and C) were determined using standard analytical procedures. Data obtained were analyzed statistically at $p \leq 0.05$.

## RESULTS AND DISCUSSION

The fortified complementary foods showed significant improvement in nutritional composition compared to the control sample. Protein content increased from 12.78% in SPA to 21.39% in ASP, indicating the contribution of mopane worm as a protein fortificant. Ash (2.82%), crude fat (5.94%), and crude fibre (6.48%) were highest in ASP, while carbohydrate content was highest in SPA (70.78%). Mineral analysis showed that PAS had the significant highest phosphorus (21.6±1.56mg), potassium (700±2.50 mg), and zinc (2.9±0.01mg), while PSA recorded the significant highest calcium (222.5±2.50 mg) and iron (1.84±0.02mg). Vitamin A was highest in ASP (2.26±6^0.02mg), while vitamin C was highest in SPA

(62.6±4.47mg) (Table 1). These findings show that using edible insects and leafy vegetables improve the nutrient density of cereal-based complementary foods [4].

**Table 1. Proximate composition (%) of complementary food formulations**

| Parameter | SPA | PSA | PAS | ASP |
|---|---|---|---|---|
| Moisture | $5.88 \pm 0.22^{a}$ | $6.49 \pm 0.05^{b}$ | $6.97 \pm 0.18^{c}$ | $6.78 \pm 0.15^{bc}$ |
| Protein | $12.78 \pm 0.05^{a}$ | $18.86 \pm 0.05^{b}$ | $19.38 \pm 0.05^{c}$ | $21.39 \pm 0.05^{d}$ |
| Ash | $1.14 \pm 0.06^{a}$ | $2.45 \pm 0.08^{b}$ | $2.78 \pm 0.10^{c}$ | $2.82 \pm 0.10^{c}$ |
| Crude fat | $5.30 \pm 0.16^{c}$ | $3.56 \pm 0.13^{a}$ | $5.01 \pm 0.17^{b}$ | $5.94 \pm 0.09^{d}$ |
| Crude fibre | $4.14 \pm 0.09^{a}$ | $5.64 \pm 0.18^{b}$ | $6.40 \pm 0.23^{c}$ | $6.48 \pm 0.22^{c}$ |
| Carbohydrate | $70.78 \pm 0.20^{d}$ | $62.99 \pm 0.28^{c}$ | $59.45 \pm 0.28^{b}$ | $56.58 \pm 0.41^{a}$ |

*Values are expressed as mean ± standard deviation (SD). Means within the same row with different superscript letters were significantly different ($p < 0.05$)*

## CONCLUSION AND RECOMMENDATIONS:

Sorghum-based complementary foods fortified with mopane worm and fluted pumpkin lea significantly improved protein and micronutrient quality. The make it affordable, sustainable, and culturally acceptable strategy for enhancing nutritional quality of complementary feeding and improving food security. Nutrition programmes should promote the use of local nutrient-dense foods, while further studies should investigate sensory acceptability and shelf-life stability.

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**Theme/sub-theme: Delivering better nutrition for all: Connecting the Dots Across Life Cycle, Systems, & Sectors/ Transforming Local Food Systems for Improved Food Security and Nutrition.**

# Antioxidant and blood glucose modulating effects of cracker from wheat-maize enriched with King of bitter (*Andrographis paniculata*) leaf extracts.

***Adeoti, O.A[1,2]., Azeez L.A[1], Elutilo, O.O and Olagoke T.C[1]**

**[1].Department of Food Science and Technology, The Oke-Ogun Polytechnic, Saki, Oyo State.**

**[2]. Department of Food Science and Technology, Federal University of Technology, Akure.**

***Corresponding author e-mail: adeotioluwole32@gmail.com +2348162480515**

**Keywords:** Diabetes mellitus, extracts, antioxidant, glucose metabolism

## HIGHLIGHTS

- Andrographis extract enhanced antioxidant activity of the samples.
- Extract enrichment increased α-amylase and glucosidase inhibition.
- $W_{10}M_{82}C_8$ showed highest bioactivity and lowest enzyme $IC_{50}$ values.

## BACKGROUND AND OBJECTİVES

Diabetes mellitus and oxidative stress are major global health concerns, driving interest in functional foods with health benefits. *Andrographis paniculata* contains phenolics and flavonoids with strong antioxidant and antidiabetic properties. Studies show its extracts help scavenge free radicals and improve glucose metabolism [1]. This study therefore explores wheat–maize crackers enriched with *Andrographis. paniculata* leaf extracts, evaluating their antioxidant and blood glucose-modulating effects for potential use in managing diabetes mellitus.

## MATERIALS AND METHOD

### Preparation of *Andrographis paniculata* leaf flour, aqueous leaf extract and cracker biscuits

Fresh leaves of *Andrographis paniculata* were harvested from a farm in Saki. The leaves were washed, then shade-dried at ambient temperature for 5-7 days. The dried leaves were milled into fine powder and sieved through a 250 µm mesh. 100 g of leaf flour was mixed with 1000 ml of distilled water, heated at 60-80 °C for 30-60 min. The mixture was cooled, filtered, and concentrated using freeze dryer. Crackers were prepared according to standard method. 1,1-diphenyl-2-picrylhydrazyl) and flavonoid contents was determined using the method of [2]. The α-amylase and glucosidase inhibitory activity was assayed following the method described by [3] with slight modifications.

## RESULTS AND DISCUSSION.

. Flavonoid content and DPPH radical scavenging activity increased with extract concentration, with $W_{10}M_{82}C_8$ showing the highest DPPH activity (77.81 %). α-amylase and α-glucosidase inhibitory activities also increased from 18.74 % and 20.36 % in the control to 69.84 % and 75.36 % $W_{10}M_{82}C_8$, respectively. These effects suggest improved ability to delay starch digestion and glucose absorption. The results support earlier reports that plant polyphenols enhance glycemic control through digestive enzyme inhibition [4].

**Table 1: Antioxidant, α-amylase and glucosidase inhibitory and $IC_{50}$ of the samples**

| Samples | DPPH (%) | TFC (mg QE/g) | α-amylase (%) | α-glucosidase (%) | α-amylase $IC_{50}$ (µg/mL) | α-glucosidase $IC_{50}$ (µg/mL) |
|---|---|---|---|---|---|---|
| $W_{100}M_0C_0$ | 24.32±0.94$^{e}$ | 1.18±0.05$^{e}$ | 18.74±0.62$^{e}$ | 20.36±0.75$^{e}$ | 612.45 ± 12.38$^{a}$ | 548.32 ± 10.74$^{a}$ |
| $W_{10}M_{88}C_2$ | 38.56±1.12$^{d}$ | 2.04±0.07$^{d}$ | 29.68±0.88$^{d}$ | 33.74±0.84$^{d}$ | 445.18 ± 10.21$^{b}$ | 398.67 ± 9.85$^{b}$ |
| $W_{10}M_{86}C_4$ | 51.38±1.08$^{c}$ | 2.91±0.09$^{c}$ | 42.15±1.03$^{c}$ | 46.81±0.96$^{c}$ | 328.74 ± 9.56$^{c}$ | 295.41 ± 8.92$^{c}$ |
| $W_{10}M_{84}C_6$ | 64.27±1.15$^{b}$ | 3.76±0.12$^{b}$ | 56.29±1.15$^{b}$ | 61.42±1.11$^{b}$ | 241.36 ± 8.44$^{d}$ | 210.58 ± 7.81$^{d}$ |
| $W_{10}M_{82}C_8$ | 77.81±1.21$^{a}$ | 4.58±0.14$^{a}$ | 69.84±1.28$^{a}$ | 75.36±1.24$^{a}$ | 176.29 ± 7.92$^{e}$ | 152.47 ± 6.88$^{e}$ |

Values are means ± SD (n=3). Means with different superscripts within columns differsignificantly ($p<0.05$). W-Wheat, M-Maize, C- Andrographis paniculata leaf extracts

## CONCLUSION AND RECOMMENDATİON(S):

Enrichment of wheat–maize crackers with *Andrographis paniculata* leaf extract significantly improved antioxidant capacity and inhibition of α-amylase and α-glucosidase. The $W_{10}M_{82}C_8$ formulation showed the highest antioxidant and antidiabetic potential. This may serve as a functional snack for managing postprandial hyperglycemia. Further studies should assess sensory quality, shelf stability, and in vivo antidiabetic efficacy.

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**SUB-THEME:** TRANSFORMING LOCAL FOOD SYSTEMS FOR IMPROVED FOOD SECURITY AND NUTRITION.

**TITLE:** ASSESSMENT OF HEAVY METALS IN COMMONLY CONSUMED SPICES IN ABEOKUTA.

**Abdussalaam R.O.[1] and Ademolu O.O[1] ***

Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta.

**Email**: omotayoademolu17@gmail.com , **Tel**: +2348109311536

**KEYWORDS:** Spices, heavy metal, bio-accumulation.

**HIGHLIGHTS**

Heavy metals in both branded and unbranded species were below the WHO permissible limits making it safe for human consumption, though trace amounts of heavy metals were detected in unbranded spices.

**BACKGROUND AND OBJECTIVES**

Spices have played a significant role in shaping global culinary traditions and medicinal practices over thousands of years (1). Meanwhile, spices contain trace and heavy metals, either naturally or due to contamination. These are toxic to humans when the intake exceeded the threshold values (2). The objective of this study was to determine the concentration and level of toxic heavy metals in commonly consumed spices using the Atomic Absorption Spectrophotometer and assessing the potential health risks on consumers.

**MATERIALS AND METHODS:** Based on the Food Frequency Questionnaire (FFQ), the study evaluated dried ground pepper (*Capsicum annuum*), thyme (*Thymus vulgaris*), curry (*Bergera koenigii*), bay-leaf (*Laurus nobilis)* and nutmeg (*Myristica fragrans*). Atomic Absorption Spectrophotometry (AAS) was used to assess the heavy metals in spices. The health risk assessment was also assessed using the Estimated daily intake (EDI), Target Hazard Quotient (THQ) and Hazard Index (HI)

**RESULTS AND DISCUSSION:** The demographic characteristics of the respondents showed that most were young adults aged 18-25 years (40.9%). Dried ground pepper (39.1%), thyme (36.7%) and curry (29.5%) were the commonly consumed spices. Laboratory analysis showed varying concentrations of heavy metals across spice samples analyzed. Unbranded bay-leaf had the highest lead concentration of 0.11mg/kg which is still below the toxic level. This finding is consistent with findings of Obianyido *et al* [3] in Enugu state which reported low concentrations of lead in commercially produced seasonings. The Estimated Daily Intake (EDI) values obtained were generally low, indicating minimal daily exposure to heavy metals through spice consumption. The Target Hazard Quotient (THQ) values for all heavy metals were below 1, indicating that spice consumption may not pose significant non-carcinogenic health risk.

**Table 1: Hazard Index of Heavy Metals Analyzed**

| Sample | Cadmium | Lead | Chromium | Nickel | Hazard index |
|---|---|---|---|---|---|
| Dried ground pepper | 2.1×10^-4 | 1.0×10^-4 | 2.2×10^-4 | 5.7×10^-5 | 5.9×10^-4 |
| Curry | 8.3×10^-5 | 2.1×10^-3 | 4.6×10^-4 | 2.3×10^-5 | 2.7×10^-3 |
| Thyme | 3.7×10^-4 | 1.9×10^-3 | 3.0×10^-3 | 4.2×10^-5 | 5.3×10^-3 |
| Bay-leaf | 7.5×10^-4 | 2.9×10^-3 | 2.7×10^-3 | 7.3×10^-5 | 6.4×10^-3 |
| Nutmeg | 8.0×10^-4 | 3.1×10^-3 | 2.0×10^-4 | 5×10^-5 | 4.1×10^-3 |

**CONCLUSION AND RECOMMENDATION:** The study showed that dried ground pepper, curry and thyme were commonly consumed among consumers in Abeokuta. The laboratory analysis also revealed that heavy metals were below the WHO permissible limit in spices, though trace amounts were detected in unbranded spices. Consumers should be encouraged to purchase properly packaged and hygienically processed spices.

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*Sub-theme: Transforming Local Food Systems for Improved Security and Nutrition*

**Comparative Effects of Fermentation, Germination and Roasting on the Nutritional Composition and Functional Properties of *Cucurbita pepo* L. Seed Flour**

***Bonomi, Z. M.[1], IBN-SHUAIB, M. M.[1], and Sa'id, S. S.[1]**

[1]Department of Biochemistry and Molecular Biology, Federal University Dutsin-ma, Katsina State, Nigeria.

Corresponding author, email: zmbonomi@fudutsinma.edu.ng

**Keywords:** Cucurbita pepo L.; fermentation; germination; roasting.

**Highlights**

- Processing modifies the nutritional composition of *Cucurbita pepo* L. seed flour.
- Processing modifies the functional properties of *Cucurbita pepo* L. seed flour.
- Choice of processing technique should depend on the intended use of the flour.

**Background**

Pumpkin (*Cucurbita pepo* L.) seeds are increasingly recognised as nutrient-dense food materials rich in proteins, lipids, minerals, essential amino acids, and several bioactive compounds [1]. Their utilisation in food systems has expanded owing to growing interest in plant-based proteins and functional foods. However, processing methods such as fermentation, roasting, and germination are known to modify the nutritional composition and functional properties of seeds [2], thereby influencing their suitability for various food applications. Comparative information on the effects of these processing methods on pumpkin seed flour remains limited, particularly in developing countries where pumpkin seeds are often underutilised despite their nutritional potential [3]. The present study therefore comparatively evaluated the effects of fermentation, germination and roasting on the proximate composition, mineral composition, fatty acid composition, selected amino acid composition and functional properties of *Cucurbita pepo* L. seed flour.

**Methods** Pumpkin seeds were processed into crude, fermented, germinated, and roasted flours using established procedures [4]. The resulting flours were analysed in triplicate for proximate composition using AOAC methods, mineral composition by Atomic Absorption Spectrophotometry, fatty acid composition by Gas Chromatography–Mass Spectrometry, amino acid composition by High Performance Liquid Chromatography, and selected functional properties using standard analytical procedures [5]. Data were analysed using one-way analysis of variance, and mean differences were separated using New Duncan's Multiple Range Test at $p < 0.05$.

**Results** Processing significantly influenced the nutritional and functional characteristics of pumpkin seed flour. Roasted pumpkin seed flour exhibited the highest concentrations of sodium, potassium, calcium, and protein, indicating improved mineral retention following thermal processing. Fermented pumpkin seed flour contained the highest crude fibre content and appreciable glutamine concentration, suggesting enhanced nutritional quality. Germinated pumpkin seed flour demonstrated superior ash content and oil absorption capacity, while crude pumpkin seed flour showed the greatest water absorption capacity and comparatively higher free fatty acid values. Lipid content remained relatively stable across all processing methods, indicating that processing exerted minimal influence on the intrinsic oil content of pumpkin seeds.

**Conclusion** The findings demonstrate that processing method is an important determinant of the nutritional quality and functional performance of pumpkin seed flour. Roasting enhanced mineral and protein contents, fermentation improved dietary fibre while germination favourably influenced selected functional properties. These processing techniques therefore offer practical opportunities for tailoring pumpkin seed flour to specific nutritional and industrial applications, thereby promoting its utilisation as a functional food ingredient and contributing to food diversification and nutritional security.

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**Transforming Local Food Systems For Improved Food Security And Nutrition**

# Chemical, Functional And Sensory Evaluation Of Complementary Foods From Blends Of Sorghum, Bambaranut And Crayfish Flours For Enriched Food Security And Nutrition

***Okwunabo O. N[1] And Alasan, V.Y[1]**
**[1]department Of Nutrition And Dietetics, The Federal Polytechnic, Bida, Niger State**
Corresponding Email:nancyokechukwu80@gmail.com

**09014001565, 08064167751**

Keywords: Sorghum, Bambaranut, Crayfish, Complementary food

Highlights:

- Complementary foods formulated from blends of sorghum, bambaranut and crayfish showed to be a high nutrient-dense local blend.
- The blends had good functionality like ideal range bulk density and water absorption making them easier to prepare.
- The blends had high acceptability with 60:35:5 been most accepted showing that locally sourced ingredients can provide affordable, acceptable foods to transform food systems and improve child nutrition in Nigeria.

**Background and Objective**: Childhood malnutrition remains a major public health challenge in many low- and middle-income countries. poor dietary quality of complementary foods and suboptimal infant feeding practices are key contributors to growth faltering during this period [1]. Promoting locally formulated, nutrient-dense complementary foods is therefore essential to improve child nutrition outcomes. The study was carried out to evaluate the chemical composition, functional properties and sensory acceptability of complementary food produced from blends of sorghum, bambaranut and crayfish flours.

**Materials and Methods**: Sorghum, bambaranut and crayfish were processed into flour. The flours were blended into ratios to formulate 80:15:5, 70:25:5, and 60:35:5 sorghum: bambaranut: crayfish complementary foods. The proximate and mineral composition were determined using AOAC methods. Functional properties including water absorption capacity, oil absorption capacity, bulk density and emulsion capacity were assessed. Sensory evaluation of the gruels were carried out by 20 semi-trained panelists using a 9-point hedonic scale for color, aroma, taste, texture and overall acceptability. Data were analyzed using ANOVA at $P<0.05$.

**Results and discussion**: Moisture, ash, protein, fat, fibre and carbohydrate content of the blends ranged from 6.9-7.5, 3.2-3.8, 12.5-15.0, 4.8-5.2, 2.6-3.4 and 65.7-69.4% respectively. Mineral contents of the complementary food blends ranged from 1.8-2.5 mg/100 g for Zn, 45-65 mg/100 g for Ca, 3.2-4.5 mg/100 g for fe, 120-160 mg/100g for phosphorus and 300-320 mg/100 g for potassium. Water absorption capacity, oil absorption capacity, bulk density and emulsion capacity of the samples ranged from 1.25-1.31 g/g, 1.05-1.72 g/g, 0.52-0.68 g/cm3 and 38.10-43.00% respectively. The blends show significantly higher protein, ash, fat, calcium, iron, phosphorus and zinc with increased inclusion of bambaranut. The inclusion levels of Bambara nut had measurable effects on the nutritional profile of the blends. The blends have good functional properties for complementary feeding and good sensory acceptability with the 60:35:5 blend being most accepted.

**Table 1: Proximate Composition of Complementary Food Blends of Sorghum, Roasted Bambara Nut, and Crayfish**

| Samples | Moisture (%) | Ash (%) | Protein (%) | Fat (%) | Crude Fiber (%) | Carbohydrate (%) | Energy (kcal/100g) |
|---|---|---|---|---|---|---|---|
| **A** | $7.5^{a}$ ±0.02 | $3.2^{c}$ ±0.01 | $12.5^{c}$ ±0.02 | $4.8^{c}$ ±0.01 | $2.6^{c}$ ±0.01 | $69.4^{a}$ ±0.02 | $378^{c}$ ±0.5 |
| **B** | $7.2^{b}$ ±0.02 | $3.5^{b}$ ±0.01 | $13.8^{b}$ ±0.02 | $5.0^{b}$ ±0.01 | $3.0^{b}$ ±0.01 | $67.5^{b}$ ±0.02 | $382^{b}$ ±0.5 |
| **C** | $6.9^{c}$ ±0.02 | $3.8^{a}$ ±0.01 | $15.0^{a}$ ±0.02 | $5.2^{a}$ ±0.01 | $3.4^{a}$ ±0.01 | $65.7^{c}$ ±0.02 | $387^{a}$ ±0.5 |

Values are means ± standard deviation of duplicate determinations. Values in the same column with different superscripts are significantly different ($p < 0.05$).

**Keys:**

**Sample A:** Sorghum 80g + Bambara 15g + Crayfish 5g
**Sample B:** Sorghum 70g + Bambara 25g + Crayfish 5g
**Sample C:** Sorghum 60g + Bambara 35g + Crayfish 5g

**Conclusion and Recommendation**: the use of sorghum, bambaranut and crayfish in complementary food formulation can contribute to transforming local food systems by providing affordable, acceptable and nutrient-dense foods that improve food security and nutrition for children in Nigeria therefore, it is recommended that utilization of bambaranut and crayfish in IYCF and community nutrition programs should be promoted and support SMEs to produce these blends to strengthen local food systems.

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**SUB-THEME: Transforming Local Food Systems for Improved Food Security and Nutrition.**

# NUTRITIONAL AND CHEMICAL PROPERTIES OF BISCUITS PRODUCED FROM BLENDS OF WHEAT FLOUR AND TIGER NUT RESIDUE FLOUR

**Okoye, C. J. [1], Ezenwa, H. C. [2], Adeoye-Agomoh, Q.C. [3]**

*Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture,Umudike*

*Jurazzy27@gmail.com, +2348060962324*

KEYWORDS: Tiger Nut Residue Flour; Wheat Flour; Biscuit; Dietary Fiber.

- Tiger nut residue flour was used to partially substitute wheat flour
- Moisture content of biscuit reduced with increased Tiger Nut Residue Flour
- A high insoluble dietary fiber was observed in 100% Tiger Nut Residue Flour

BACKGROUND AND OBJECTIVES*:* The study was aimed at finding out the nutritional and chemical composition of biscuits produced from blends of wheat flour and tiger nut residue flour.

MATERIALS AND METHODS**:** Biscuits were produced using a modified rubbing in method. Flour blends comprising Wheat Flour(WF) and Tiger Nut Residue Flour (TGRF)were mixed in these ratios respectively BWF (100 WF), BWTF1 (30:70), BWTF2 (50:50), BWTF3 (30:70), BWTF4 (100TGRF). Dry ingredients (30g sugar, 0.02g salt, 2g baking powder, 1tsp nutmeg, 93g margarine, 90g eggs, 50g milk and 5g vanilla flavor were rubbed in with the flour blends and the mixture was kneaded manually to form a dough. The dough was rolled to a uniform thickness of approximately 3 mm, cut into standardised round shapes, and baked at 160°C for 15–20 minutes. Baked biscuits were allowed to cool at ambient temperature before packaging in airtight polyethylene bags for analysis.

RESULTS: moisture content decreased with increasing TGRF substitution (4.63% to 2.55%), in line with the findings of [3] who also reported a decrease in moisture content with increased tiger nut substitution while ash content increased (1.07% to 3.90%), indicating enhanced mineral density. Protein content declined from 11.07% (BWF) to 10.02% (BWTF4), in line with the findings of [1] and fat content reduced (17.34-21.14%) in contrast to the report from [2] who reported an increased fat content with an increase in TGRF substitution. Carbohydrate content increased from 58.20% to 65.36%, which is consistent with the findings of [4], with energy values ranging from 461.74to 496.55 kcal/100g. The BWTF4 had significantly ($p<0.05$) more insoluble dietary fiber (4.72%) than the others. Soluble fiber was highest in BWTF1 (1.12%) than other biscuits. [5] also reported a higher dietary fiber profile with values ranging from 2.52 to 19.47%, 1.95 to 11.72% and 0.57 to 8.65% for total, insoluble and soluble dietary fibers respectively.

**Table 1. Dietary Fiber Composition of Biscuit produced from wheat flour and tiger nut residue flour blends.**

| Sample | Insoluble dietary fiber (%) | Soluble dietary fiber (%) | Total dietary fiber (%) |
|---|---|---|---|
| BWF | $0.20^{e}\pm 0.01$ | $1.03^{b}\pm 0.03$ | $1.23^{e}\pm 0.01$ |
| BWTF1 | $0.95^{d}\pm 0.03$ | $1.12^{a}\pm 0.01$ | $2.07^{d}\pm 0.04$ |
| BWTF2 | $1.54^{c}\pm 0.04$ | $0.89^{c}\pm 0.01$ | $2.43^{c}\pm 0.02$ |
| BWTF3 | $2.48^{b}\pm 0.03$ | $0.85^{c}\pm 0.01$ | $3.33^{b}\pm 0.01$ |
| BWTF4 | $4.72^{a}\pm 0.03$ | $0.76^{d}\pm 0.04$ | $5.48^{a}\pm 0.01$ |

Values are mean ± standard deviation of samples

CONCLUSION: This study demonstrated that partial substitution of wheat flour with tiger nut residue flour significantly enhances the nutritional profile of biscuits, particularly in terms of ash (mineral) content, fat, and energy density, while reducing moisture and carbohydrate content. REFERENCES

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**Theme/sub-Theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title: Impact of Nutrition Education on Knowledge of Fruit and Vegetable Consumption among College Education Student in Southwest Nigeria**

**Name of Authors: Akerele, R.A., [1] *Adebimpe, A.T.,[2] Olunusi, P.A.[3] & Adebayo, Y.O.[4]**

**Affiliation of Author (s)**: [1&3] Department of Home Economics and Hotel Management, Tai Solarin University of Education, Ijebu-Ode, Ogun State, Nigeria.

[2]*Department of Home Economics Education, Emmanuel Alayande University of Education, P.M.B 1010, Oyo State, Nigeria

[4]Department of Nutrition and Dietetics, Bowen University, Iwo, Osun State Nigeria.

***Corresponding author:** funketaiwo29@gmail.com, +2438034652901

**KEYWORDS:** Nutrition Education**,** Fruits and Vegetable, Knowledge, Colleges of Education Students

**Highlights**.

- Experimental Group's Nutrition knowledge of Fruits and Vegetables (FV) was higher than the control's.
- Knowledge significantly increased after delivering Nutrition Education (NE) to respondents.
- NE had significant impact on College of Education Students' knowledge of FV

## BACKGROUND AND OBJECTIVES

Nutrition plays a fundamental role in human health and development, [1,2]. Dietary patterns among Nigerian undergraduates reveal a heavy reliance on energy-dense foods with minimal inclusion of FV [3]. This study evaluated the impact of NE on knowledge of FV consumption among CES in Southwest Nigeria.

## MATERIALS AND METHODS

A quasi-experimental design was adopted for the study. Random sampling technique was used to select 474 CES from 4 public Colleges of Education in Ogun and Oyo States. Experimental group received a four-week NE about FV using an adapted manual. .Quizzes were administered pre and post intervention, while the control group did not receive any treatment. Data were collected using Knowledge of FV Achievement Test (r=0.75) A 19-item knowledge scale was used to determine respondents' level of knowledge and was categorized as; poor and good. Analysis of Covariance (ANCOVA) was employed to test hypothesis at a 0.05 level of significance.

**RESULTS AND DISCUSSION** The percentage of respondents who possessed good knowledge of FV increased from 71.7% to 89.0% after delivering NE to them, while a decrease was reported among the control group. There was a significant difference ($p < 0.05$) in the knowledge score of the respondents pre and post intervention [4].

**Table 1: Knowledge Score of the Respondents at Pre-intervention and Post-intervention**

| Knowledge Score Category | Control group | | | Intervention group | | |
|---|---|---|---|---|---|---|
| | Pre-intervention | Post-intervention | p-value | Pre-intervention | Post-intervention | p-value |
| Poor Knowledge (0-12) | 66(27.8) | 113(47.7) | **<0.001** | 67(28.3) | 26(11.0) | **<0.001** |
| Good Knowledge (13-19) | 171(72.2) | 124(52.3) | | 17 0(71.7) | 211(89.0) | |
| Total | 237 | 237 | | 237 | 237 | |

**CONCLUSION AND RECOMMENDATIONS:** Nutrition Education improved College of Education Students' knowledge about fruits and vegetable consumption. Nutrition education is advocated for among the respondents.

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**Theme/sub-theme: Transforming local food systems for improved food security and nutrition.**

**Title: EVALUATION OF PROXIMATE, MINERAL AND PHYTOCHEMICAL COMPOSITIONS OF *AJU MBAISE*- A POLY HERBAL EXTRACT**

**Name of authors:** [1]Okereke, I. F., [2]Okeke, P. N., [2]Onyeneke. E. N., [1]Ukegbu, P. O. and [3]Arukwe, D. C.

**Affiliation of Authors:** [1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture. Umudike, Abia State, Nigeria.

[2]Department of Nutrition and Dietetics, Imo State University, Owerri, Imo State, Nigeria.

[3]Department of Food Science and Technology, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

**Correspondence: okereke.ijeoma@mouau.edu.ng., +2348035782775**

**Background and Objectives:** Aju Mbaise is a traditional poly-herbal extract indigenous to Mbaise and widely used in southeastern Nigeria for postpartum care and general wellness (1). Herbal medicine is a reality of many cultures especially in Africa, particularly in Nigeria such that despite the advancement of orthordox medicine, it is still well entrenched and practiced because of its better cultural acceptability and compatibility with the human physiology and least side effects (2).

**Objective:** The main aim of the study was to evaluate the nutritional composition and phytochemical properties of Aju Mbaise, a traditional poly-herbal formulation.

**Materials and method:** This experimental study used dried Aju Mbaise poly-herbal samples sourced from reputable traditional herbal vendors at Afor Oru Market in Ahiazu Mbaise Local Government Area, Imo State, Nigeria. The plant samples include Euphorbia convolvuloids (Spurge), Uvaria chamae (Bush banana), Spondias mombine (hog plant), Ceiba petandra (Silk cotton plant), Napoleona vogelli (Hat plant) and Barteria fistulosa (Ant plant) (3). The analyses were carried out using standard methods of (4).

**Results:** Overall, the findings demonstrated that the individual plants vary widely in their nutrient profiles and the Aju mbaise poly-herbal extract integrates several nutritional traits. High moisture (58.89%), protein (0.05%) and carbohydrate (28.51%) contents were significantly recorded in the Aju Mbaise poly-herbal extract. The low protein content (0.05%) in whole Aju Mbaise extract suggest that the extract is not a significant source of protein in the diet. The fat content (5.17%) contributes to energy value and may affect its flavor and mouthfeel.

**Table 1: The proximate composition of individual poly-herbal plants and the APE**

| Sample | Moisture content (%) | Crude Protein (%) | Fat (%) | Crude fiber (%) | Ash (%) | Carbohydrate (%) |
|---|---|---|---|---|---|---|
| EC | $18.00^{c} \pm 0.01$ | $0.88^{b} \pm 0.01$ | $3.21^{d} \pm 0.01$ | $2.10^{g} \pm 0.01$ | $3.80^{d} \pm 0.01$ | $6.98^{g} \pm 0.01$ |
| SM | $15.13^{d} \pm 0.01$ | $11.04^{d} \pm 0.01$ | $4.82^{b} \pm 0.01$ | $10.51^{d} \pm 0.01$ | $6.09^{c} \pm 0.01$ | $48.92^{a} \pm 0.01$ |
| CP | $14.34^{e} \pm 0.01$ | $12.32^{c} \pm 0.01$ | $2.41^{e} \pm 0.01$ | $18.64^{b} \pm 0.01$ | $7.26^{b} \pm 0.01$ | $40.59^{b} \pm 0.01$ |
| UC | $32.70^{b} \pm 0.01$ | $22.40^{a} \pm 0.01$ | $4.16^{c} \pm 0.01$ | $28.32^{a} \pm 0.01$ | $1.65^{f} \pm 0.01$ | $7.65^{e} \pm 0.01$ |
| NV | $5.35^{f} \pm 0.01$ | $1.93^{e} \pm 0.01$ | $2.16^{f} \pm 0.01$ | $16.00^{c} \pm 0.01$ | $13.68^{a} \pm 0.01$ | $7.47^{f} \pm 0.01$ |
| BF | $5.\ 35^{f} \pm 0.01$ | $18.74^{b} \pm 0.01$ | $2.10^{g} \pm 0.01$ | $9.81^{e} \pm 0.01$ | $2.66^{e} \pm 0.01$ | $40.48^{c} \pm 0.01$ |
| WPE | $58.89^{a} \pm 0.00$ | $0.05^{f} \pm 0.01$ | $5.17^{a} \pm 0.01$ | $8.89^{f} \pm 0.01$ | $2.65^{e} \pm 0.01$ | $28.51^{d} \pm 0.01$ |

Values are mean ± standard deviation of samples.

[a-g] Means with similar superscripts within the same column are not significantly different ($p>0.05$)

**Key:**
E.C- *Euphorbia convoluloids*
S.P- *Spordia mombine*
C.P- *Ceiba petandra*
U.V- *Uvarian chamae*
N.P- *Napoleora vogellia*
B.F- *Bacteria fisulosa*
W.P.E- Whole Polyherbal extract

**Photochemical analysis**

The phytochemical analysis of the polyherbal extract (Aju Mbaise) indicates rich presence of bioactive compounds, notably flavonoids (32.93mg/100mL) and saponins (25.47mg/100mL), followed by alkaloids (23.61mg/100mL) and phenols (19.65±0.14 mg/100mL). The qualitative test results further confirmed the presence of these phytochemicals, with flavonoids and saponins showing the highest intensity (+++), followed by alkaloids and phenols (++), while steroids, terpenoids, and cardiac glycosides showed weak presence (+).

**Table 2: Quantitative and qualitative phytochemical analysis**

| Phytochemical | Result of qualitative test | Result of quantitative test\|(ml/100g) |
|---|---|---|
| Alkaloids | ++ | 23.61±0.09 |
| Saponins | +++ | 25.47±0.25 |
| Steroids | + | 3.52±0.10 |
| Flavonoids | +++ | 32.93±0.16 |
| Phenols | ++ | 19.65±0.14 |
| Tannins | ++ | 13.53±0.22 |
| Terphnoids | + | 4.59±0.06 |
| Cardine glycosides | + | 3.18±0.02 |

+= present in low quantity

++= present in moderate

+++= present in high

**Conclusion:** This study provides baseline scientific data on the proximate, mineral and phytochemical compositions of Aju Mbaise poly-herbal extract, a traditional poly-herbal blend widely used in southeastern Nigeria. The findings suggest that Aju Mbaise poly-herbal extract contains beneficial nutrients and bioactive compounds that account for it antioxidant, antimicrobial, anti-inflammatory and postpartum health benefits. By linking indigenous knowledge with scientific validation, this work lays the foundation for further exploration of Aju Mbaise poly-herbal extract as a potential nutraceutical or functional food.

**Keywords: Aju Mbaise, Poly-herbal, Nutraceuticals, Postpartum care.**

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**Transforming Local Food Systems for Improved Food Security and Nutrition**

# Proximate and Sensory Evaluation of Complementary Foods Produced from Millet, Soyabean, Orange-Fleshed Sweet Potato, Crayfish and Dates

**Ezenwa, H.C.[1], Okiyi, C.E.[1], Ifetoye, O. P.[1], Ezenwa, U. P.[1], Onwuama, P. C.[1], Ofoegbu, N. H[1], Ugama, V. A.[1], Uloma, J.C[1].**

Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike. Umuahia, Abia State.

sallypifetoye@gmail.com . 08144187209

**Keywords:** Complementary food, Millet, Soybean, Proximate composition.

## Highlights

- Increasing soybean substitution significantly increased protein, fat, and ash while reducing carbohydrate and moisture contents.
- Forty-eight and seventy-two hour millet fermentation showed only slight or no significant differences in nutrient improvement and sensory acceptability.

**BACKGROUND AND OBJECTIVES:** Protein-energy malnutrition among infants remains a major public health concern in developing countries due to the poor nutrient quality of many cereal-based complementary foods [1, 2**]**. This study evaluated the proximate composition and sensory acceptability of complementary foods produced from fermented millet, soyabean, orange-fleshed sweet potato, crayfish and dates.

**MATERIALS AND METHODS:** Millet was fermented for 48 and 72 hours, processed into flour and blended with soyabean, orange-fleshed sweet potato, crayfish and dates to formulate complementary foods, while proximate composition and sensory attributes were determined using standard AOAC (2023) methods. Sensory evaluation was conducted using a 9-point Hedonic scale, and data were analysed by one-way ANOVA at $p < 0.05$. [3]

**RESULTS AND DISCUSSION:** Significant differences ($p < 0.05$) were observed in the proximate composition and sensory attributes of the formulated complementary foods. Increasing soyabean substitution improved protein, fat, fibre, ash and energy contents, while reducing moisture and carbohydrate. Sample C2 recorded the highest energy, fat and fibre contents. Fermentation for 72 hours produced only slight nutritional improvements over 48 hours. Although the commercial control had the highest sensory scores, C1 was the most acceptable among the formulated samples, while C2 recorded the highest aroma score. Overall, soyabean enrichment improved nutritional quality with acceptable sensory characteristics.

**Table 1: Proximate Composition of Complementary Foods**

| Samples | Moisture (%) | Protein (%) | Fat (%) | Fibre (%) | Ash (%) | Carbohydrate (%) | Energy (kcal/100 g) |
|---|---|---|---|---|---|---|---|
| MSO A1 | 7.84±0.06$^{b}$ | 25.45±0.04$^{f}$ | 6.22±0.04$^{g}$ | 1.83±0.04$^{e}$ | 3.46±0.04$^{c}$ | 55.17±0.06$^{a}$ | 378.42±0.08$^{f}$ |
| MSO B1 | 7.64±0.06$^{c}$ | 33.55±0.06$^{d}$ | 7.02±0.04$^{d}$ | 2.11±0.04$^{c}$ | 3.79±0.05$^{b}$ | 45.90±0.04$^{d}$ | 380.96±0.04$^{d}$ |
| MSO C1 | 6.85±0.06$^{e}$ | 40.03±0.03$^{a}$ | 8.32±0.04$^{b}$ | 2.92±0.03$^{a}$ | 4.66±0.04$^{a}$ | 37.24±0.08$^{f}$ | 383.90±0.11$^{b}$ |
| MSO D1 | 8.68±0.06$^{a}$ | 20.53±0.05$^{g}$ | 4.75±0.03$^{f}$ | 1.37±0.05$^{f}$ | 2.82±0.03$^{d}$ | 54.86±0.01$^{b}$ | 344.29±0.00$^{g}$ |
| MSO A2 | 7.60±0.04$^{c}$ | 27.02±0.03$^{e}$ | 6.32±0.04$^{e}$ | 1.96±0.03$^{d}$ | 3.41±0.06$^{c}$ | 53.70±0.00$^{c}$ | 379.76±0.49$^{e}$ |
| MSO B2 | 7.46±0.05$^{d}$ | 34.03±0.04$^{c}$ | 7.31±0.05$^{c}$ | 2.25±0.05$^{b}$ | 3.85±0.04$^{b}$ | 45.08±0.12$^{e}$ | 382.15±0.78$^{c}$ |
| MSO C2 | 6.79±0.05$^{e}$ | 39.80±0.05$^{b}$ | 8.59±0.04$^{a}$ | 3.02±0.05$^{a}$ | 4.63±0.04$^{a}$ | 37.19±0.13$^{f}$ | 385.21±0.39$^{a}$ |

**Table 2. Sensory Evaluation of Complementary Foods**

| Samples | Appearance | Aroma | Flavour | Mouth-feel | Overall Acceptability |
|---|---|---|---|---|---|
| **MSO A1** | 5.12$^{b}$ ± 2.15 | 4.16$^{bcd}$ ±2.36 | 3.76$^{d}$ ± 2.44 | 4.32$^{cd}$ ± 2.73 | 4.34$^{bcd}$ ± 2.11 |
| **MSO B1** | 5.44$^{b}$ ± 1.98 | 4.32$^{bcd}$ ± 1.91 | 3.40$^{d}$ ± 1.63 | 4.08$^{cd}$ ± 2.18 | 4.31$^{bcd}$ ± 1.61 |
| **MSO C1** | 5.64$^{b}$ ± 1.75 | 5.08$^{bc}$ ± 2.02 | 5.08$^{c}$ ± 1.66 | 5.28$^{c}$ ± 1.90 | 5.27$^{b}$ ± 1.53 |
| **MSO A2** | 5.20$^{b}$ ± 2.14 | 3.76$^{d}$ ± 1.90 | 2.84$^{d}$ ± 2.01 | 3.56$^{d}$ ± 2.40 | 3.84$^{d}$ ± 1.70 |
| **MSO B2** | 5.04$^{b}$ ± 1.98 | 3.96$^{cd}$ ± 1.88 | 3.44$^{d}$ ± 1.78 | 4.40$^{cd}$ ± 2.04 | 4.21$^{cd}$ ± 1.54 |
| **MSO C2** | 5.36$^{b}$ ± 2.27 | 5.16$^{b}$ ± 2.03 | 4.88$^{c}$ ± 2.17 | 4.96$^{c}$ ± 2.37 | 5.09$^{bc}$ ± 2.02 |
| **MSO D1** | 7.84$^{a}$ ± 1.43 | 7.32$^{a}$ ± 1.75 | 7.00$^{b}$ ± 1.94 | 7.00$^{b}$ ± 1.98 | 7.29$^{a}$ ± 1.58 |

*Values are mean ± SD with different superscripts within columns indicating significant differences ($p < 0.05$).*

**Key:**

MSO A1: Millet 60%, Soya Bean 15%, OFSP 15%, Crayfish 5%, Date 5%

MSO A2: Millet 60%, Soya Bean 15%, OFSP 15%, Crayfish 5%, Date 5%

MSO B1: Millet 50%, Soya Bean 25%, OFSP 15%, Crayfish 5%, Date 5%

MSO B2: Millet 50%, Soya Bean 25%, OFSP 15%, Crayfish 5%, Date 5%

MSO C1: Millet 40%, Soya Bean 35%, OFSP 15%, Crayfish 5%, Date 5%

MSO C2: Millet 40%, Soya Bean 35%, OFSP 15%, Crayfish 5%, Date 5%

SO D1: Control (commercial infant product) **CONCLUSION AND RECOMMENDATIONS:** The formulated complementary foods were nutritionally superior to the commercial control, with **C2** exhibiting the best nutritional profile and **C1** showing the highest acceptability among the developed products. Fermentation beyond 48 hours resulted in only slight improvements in nutrient composition and sensory quality. These formulations have potential as affordable, nutrient-dense complementary foods for infant and young child feeding.

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**SUB-THEME:** Transforming Local Food Systems for Improved Food Security and Nutrition

**TITLE:** Nutritional Evaluation of Masa formulated from maize (*Zea mays*), soy beans (*Glycine max*) and edible insect (winged termite) (*Macrotermes bellicosus*).

**NAME OF AUTHOR**: [1]Onaolapo T. T, [1]Ilori O. A, [1]Lam F.J, [1]Olatunji T J, [2]Ezekiel S. O and [3]Omolewa, P.O.,

**Affiliation:** [1]Department of Nutrition and Dietetics, Moshood Abiola Polytechnic Abeokuta, Ogun State. [2]Research Unit, NSIA-LUTH Cancer Centre, Lagos. [3] Department of Nutrition and Dietetics, Wesley University, Ondo, Ondo State, Nigeria

**Email and Phone Number:** patienceodun2017@gmail.com or tosinonaolapo@gmail.com +2348161825094 or +2348135335412

**KEYWORDS:** Masa, Soy beans, Edible insect (Winged termite), Indigenous snacks.

**HIGHLIGHTS:**

- Protein content of the fortified blends increased significantly from 19.47% to 23.08%
- Significant increase in all mineral analyzed which includes Phosphorus, iron, calcium, zinc and copper
- Higher vitamin changes were seen in the fortified masa than the control.
- The blends demonstrated that fortification of indigenous foods helps in increasing the nutritional composition of our staple foods.

## BACKGROUND AND OBJECTIVES

Masa is a yeast-fermented indigenous snack which is round in shape and is prepared in Nigeria and some other West African countries from millet, maize or rice flour [1]. Masa is as popular as ogi (a fermented gruel from maize), but receive less attention than the letter. It could be eaten with granulated sugar or honey or tomatoes sauce or local spices because of its sour taste [2]. However, some indigenous snacks are deficient in one or more essential nutrient. There is therefore a need to improve their nutritional quality thus providing a nutritious and healthier alternative to western snacks which can be acceptable by the consumers. Maize (*Zea mays*) is one of the important food crops worldwide, serving as staple food, livestock feed and industrial raw material. Soybean (*Glycine max*) is a widely cultivated legume valued for its exceptional nutritional profile and functional versatility in food systems, nutritionally soybean complements cereals like maize by supplying essential amino acids that are deficient in cereals, particularly lysine [3]. This study evaluated the proximate and mineral composition of masa developed from maize (*Zea mays*), soy beans (*Glycine max*) and winged termite (*Macrotermes bellicosus*).

## MATERIALS AND METHODS

An experimental study design was adopted. Maize flour, soy beans flour and winged termite flour were prepared using standard processing methods and mixed. Four formulations were produced: First blend ($MF_{80}$:$SF_{10}$:$EIP_{10}$), Second blend ($MF_{80}$:$SF_{15}$:$EIP_{5}$), Third blend ($MF_{80}$:$SF_{5}$:$EIP_{15}$) and Fourth blend ($MF_{100}$). Proximate composition, mineral content and vitamin content were determined using standard analytical procedures. Data obtained were analyzed statistically using SPSS version 27 at $p \leq 0.05$

MF = Maize flour, SF = Soy bean flour, EIP = Edible insect flour

## RESULTS AND DISCUSSION

The fortified indigenous snacks (masa) showed significant increments in nutritional composition when compared to the control (Maize flour 100%). Protein content increased from 14.69% in $MF_{100}$ to 23.08% in $MF_{80}$:$SF_{10}$:$EIP_{10}$, indicating the contribution of both soybean flour and Edible insect as a protein fortificant, which can aid in body building, crude fat was seen high in $MF_{80}$:$SF_5$:$EIP_{15}$, which can be due to higher increase of edible insect in this blend. Ash (5.69%) was seen high in the $MF_{80}$:$SF_5$:$EIP_{15}$ blend; total carbohydrate (45.56%) was seen high in the control sample $MF_{100}$. Mineral analysis showed that $MF_{80}$:$SF_5$:$EIP_{15}$ had significantly higher zinc (2.74 ± 0.06mgc) and copper (1.15 ± 0.05mgb) than all remaining blends, while phosphorus (298.15 ± 0.05mgd), iron (3.94 ± 0.06mgc), and calcium (71.94 ± 0.08mgd) were highest in $MF_{80}$:$SF_{15}$:$EIP_5$. Vitamin E ranges from 8.13 ± $0.03^a$µg to 8.34 ± $0.06^b$µg the highest value was seen in sample $MF_{80}$:$SF_{10}$:$EIP_{10}$, while Vitamin B1 (0.66 ± $0.04^c$mg), Vitamin B3 (12.01 ± $0.06^c$mg), Vitamin B6 (0.35 ± $0.04^b$mg) and vitamin K (0.54 ± $0.04^b$µg) were seen significantly high in sample $MF_{80}$:$SF_5$:$EIP_{15}$. These findings show that soybean and edible insect winged termite can be included in our indigenous snack to enhance nutrient content.

## CONCLUSION AND RECOMMENDATIONS

The processing methods of the samples fortified with winged termite and soybean are very simple and not very different from what is generally known as the method for normally consumed masa. The use of these fortificants is here by recommended for all individuals mostly because the resources are affordable and culturally acceptable to everyone. As an indigenous snack sold in ready-to-eat form, enriched masa has potential to be promoted as a nutritious, healthy food choice as snack. Further work should be carried out by varying the proportion of the soybean and winged termite in each base of the masa sample, as well as determining the anti-nutritional compositions of the formulations

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**Sub theme: Transforming local food system for improved food security and nutrition**

**Title**: **Waste to Wealth: Assessing the Sensory and Functional properties of Fruit Peel Blends Towards Sustainable Nutrition**

**Name of Authors**: *Anisi, K. S.[1] & Onyenweaku, E. O.[2]

**Affiliation of Authors**: [1]Department of Human Nutrition & Dietetics, Faculty of Allied Medical Sciences, University of Calabar, Nigeria.

*Corresponding author, e-mail: kaobiemydi@gmail.com ,+2348063912193.

**Keywords**: food waste, fruit peels, sustainability, functional properties

**Highlights**:

- The integration of fruit peels into food systems is a promising strategy for reducing food waste.
- Fruit peels show strong antioxidant and antimicrobial effects that may help reduce diet-related NCDs.
- These findings demonstrate consumer acceptability of the novel fruit peel blend additives.

**Abstract**

Background and Objectives: Fruit peels are reported to possess a remarkable and sometimes higher content of valuable phytochemical compounds compared to the traditionally exploited fruit parts; thus, they can be applied in food product formulation and fortification based on their consumer acceptability and physicochemical properties [1]. This study aimed to formulate and compare the sensory and functional properties of nine fruit peel blends designed as dietary additives.

Methodology: The study was experimental; nine fruit peels were processed into three primary blends: orange–lemon–mandarin (OLM), pineapple–cucumber–green apple (PCG), and watermelon–guava–red apple (WGR). Each blend was produced in three variations (A, B, and C). Before analysis, the peels were cleaned, dried, debittered, and ground into powder. Laboratory analyses followed AOAC standard methods, and data were statistically analysed using ANOVA in SPSS version 20.0, with significance set at $p<0.05$.

Results and Discussion: Sensory evaluation revealed significant differences ($p<0.05$) in taste, with scores ranging from 3.60±0.49 for OLMB to 5.87±0.38 for PCGC. Aroma ratings were statistically similar across samples. The WGRB variant achieved the highest overall acceptability, whereas OLMB and WGRC recorded the lowest (4.20±0.62). Solubility varied from 10.5±0.02% (WGRC) to 16.8±0.04% (PCGB), and PCGB exhibited the highest water absorption capacity at 3.3±0.01 ml/g.

**Table 1: Sensory Attributes and General Acceptability of the fruit peel blends**

| Blends | Aroma | Color | Taste | Texture | General Acceptability |
|---|---|---|---|---|---|
| OLMA | $4.87 \pm 0.50^{a}$ | $5.80 \pm 0.30^{a}$ | $4.53 \pm 0.56^{a}$ | $5.07 \pm 0.62^{a}$ | $4.80 \pm 0.74^{a}$ |
| OLMB | $4.80 \pm 0.48^{a}$ | $5.47 \pm 0.32^{a}$ | $3.60 \pm 0.49^{b}$ | $4.47 \pm 0.65^{b}$ | $4.20 \pm 0.66^{a}$ |
| OLMC | $5.40 \pm 0.42^{a}$ | $5.93 \pm 0.41^{a}$ | $4.14 \pm 0.51^{c}$ | $6.40 \pm 0.47^{c}$ | $4.50 \pm 0.57^{a}$ |
| PCGA | $5.87 \pm 0.41^{a}$ | $6.13 \pm 0.38^{a}$ | $5.43 \pm 0.53^{d}$ | $5.50 \pm 0.49^{d}$ | $4.40 \pm 0.42^{a}$ |
| PCGB | $5.60 \pm 0.38^{a}$ | $6.13 \pm 0.36^{a}$ | $5.53 \pm 0.31^{e}$ | $5.40 \pm 0.42^{e}$ | $5.60 \pm 0.40^{a}$ |
| PCGC | $5.80 \pm 0.57^{a}$ | $6.20 \pm 0.28^{a}$ | $5.87 \pm 0.38^{f}$ | $6.40 \pm 0.35^{f}$ | $5.00 \pm 0.51^{a}$ |
| WGRA | $6.20 \pm 0.41^{a}$ | $5.60 \pm 0.35^{a}$ | $5.13 \pm 0.36^{g}$ | $5.33 \pm 0.40^{g}$ | $5.07 \pm 0.44^{a}$ |
| WGRB | $5.93 \pm 0.41^{a}$ | $6.60 \pm 0.38^{a}$ | $5.60 \pm 0.24^{h}$ | $6.80 \pm 0.41^{h}$ | $5.87 \pm 0.48^{a}$ |
| WGRC | $6.13 \pm 0.39^{a}$ | $6.33 \pm 0.34^{a}$ | $5.80 \pm 0.49^{i}$ | $5.47 \pm 0.42^{i}$ | $4.20 \pm 0.62^{a}$ |

Keys: OLM=Orange/Lemon/Mandarin; PCG = Pineapple/Cucumber/Green apples; WGR= Watermelon/ Guava/ Red apples

Values are expressed as mean ± SEM, n = 15. Values in the same column with different superscripts are significantly different at $p<0.05$

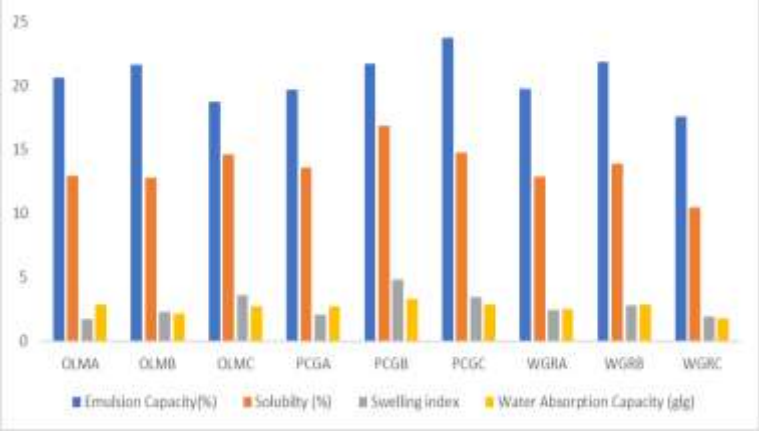



Fig1: Functional properties of the fruit peel blends

Conclusion and Recommendation: Research shows that fruit peels are rich in micronutrients and antioxidants, hence these blends can enhance the nutritional value of food systems and help reduce food waste [2]. These findings demonstrate consumer acceptability of the novel fruit peel blend additives.

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**Theme/sub-theme: Transforming Local Food Systems for Improving Food Security and Nutrition**

# Title: Proximate Composition and Sensory Evaluation of Honey-Sweetened Cakes from Wheat and Unripe Plantain Flour Blends

**Authors: *Anjorin, O. J.[1], Folorunso, A. A.[1], and Folasire, O.[2]**

**Affiliation of Author**s: [1]Department of Human Nutrition and Dietetics, Obafemi Awolowo

University.

[2]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo State, Nigeria.

*Corresponding author, oyewoleanjorin@gmail.com. +2347032514169

**Keywords**: Unripe Plantain Flour, Honey-Sweetened Cakes, Composite flour, Dietary fibre, Sensory evaluation.

## Highlights

- Wheat-unripe plantain flour blends significantly influenced the proximate composition of honey-sweetened cakes
- Composite flour cakes maintained good sensory acceptability despite differences in formulation
- Honey-sweetened cakes produced from wheat-unripe plantain flour blends showed potential as alternative bakery products

**BACKGROUND AND OBJECTIVES**: Cakes produced predominantly from refined wheat flour may have limited nutritional value [1]. Incorporation of unripe plantain flour into wheat flour provides an opportunity to diversify bakery ingredients and modify the nutritional composition of cakes while maintaining acceptable sensory characteristics [2]. This study evaluated the proximate composition and sensory acceptability of honey-sweetened cakes produced from wheat and unripe plantain flour blends at different substitution levels.

**MATERIALS AND METHODS**: Five cake formulations were produced using wheat and unripe plantain flour blends. SMB1 consisted of 100% wheat flour and served as the control, while SMB2, SMB3, SMB4, and SMB5 contained 50%, 30%, 60%, and 80% unripe plantain flour, respectively, with corresponding wheat flour proportions of 50%, 70%, 40%, and 20%. The substitution levels were selected to provide a range of unripe plantain flour incorporation and to evaluate their effects on the proximate composition and sensory characteristics of the cakes with the aim of identifying a formulation that provides a balance between nutritional characteristics and sensory acceptability. Honey was used as the sweetener in all formulations instead of refined sugar because the study was designed to develop a honey-sweetened bakery product using an alternative sweetener. Honey also contains small amounts of nutrients and bioactive compounds. Proximate composition was determined using standard AOAC methods. Sensory evaluation was conducted by 30 semi-trained panelists using a nine-point hedonic scale to assess appearance, colour, taste, texture, flavour, and overall acceptability. Data were analyzed using one-way Analysis of Variance (ANOVA), and Duncan's Multiple Range Test (DMRT) was used to separate means where significant differences occurred. Statistical significance was set at $p < 0.05$.

**Table 1: Proximate Composition of Honey-Sweetened Cakes Produced from Wheat and Unripe Plantain Flour Blends**

| Cake | Moisture | Ash | Crude Fibre | Ether Extract | Crude Protein | Carbohydrate |
|---|---|---|---|---|---|---|
| SMB 1 | 27.13±0.04$^{e}$ | 1.30±0.01$^{e}$ | 3.83± 0.03$^{a}$ | 22.04±.01$^{c}$ | 6.04±0.02$^{e}$ | 43.57±0.01$^{b}$ |
| SMB 2 | 36.96±0.02$^{a}$ | 1.90±0.01$^{d}$ | 0.59±0.02$^{c}$ | 21.55±0.08$^{d}$ | 10.05±0.04$^{a}$ | 29.68±0.02$^{d}$ |
| SMB 3 | 33.75±0.07$^{b}$ | 1.95±0.01$^{c}$ | 0.34±0.01$^{e}$ | 29.38±0.03$^{a}$ | 6.59±0.04$^{d}$ | 28.47±0.03$^{e}$ |
| SMB 4 | 32.23±0.03$^{d}$ | 2.23±0.04$^{a}$ | 0.53±0.21$^{d}$ | 25.08±0.03$^{b}$ | 10.04±0.01$^{b}$ | 30.53±0.04$^{c}$ |
| SMB 5 | 33.25±0.09$^{c}$ | 2.17±0.04$^{b}$ | 0.82±0.01$^{b}$ | 20.18±0.03$^{e}$ | 8.08±0.01$^{c}$ | 35.50±0.02$^{a}$ |

*Note: SMB1: Cake made from 100% wheat, SMB2: Cake made from 50% unripe plantain flour +50% wheat flour, SMB3: Cake made from 70% + wheat flour 30% unripe plantain flour, SMB 4: Cake made from 60% unripe plantain flour+ 40% wheat flour, SMB5: Cake made from 80% unripe plantain flour+ 20% wheat flour.*

**Table 2: Sensory Properties of Honey-Sweetened Cakes Produced from Wheat and Unripe Plantain Flour Blends**

| Sample | Appearance | Colour | Taste | Texture | Flavour | Overall acceptability |
|---|---|---|---|---|---|---|
| SMB 1 | 8.22±0.84$^{a}$ | 7.96±1.03$^{a}$ | 8.28±0.95$^{a}$ | 8.28±0.97$^{a}$ | 8.24±0.96$^{a}$ | 8.36±0.78$^{a}$ |
| SMB2 | 7.62±0.95$^{d}$ | 7.60±0.83$^{c}$ | 7.56±1.23$^{b}$ | 7.60±1.13$^{c}$ | 7.58±1.23$^{c}$ | 7.70±1.06$^{b}$ |
| SMB3 | 7.48±1.05$^{c}$ | 7.30±1.34$^{e}$ | 7.08±1.50$^{e}$ | 7.42±1.37$^{d}$ | 7.42±1.13$^{e}$ | 7.50±1.40$^{e}$ |
| SMB4 | 7.64±1.10$^{c}$ | 7.52±1.54$^{d}$ | 7.46±1.49$^{d}$ | 7.40±1.47$^{e}$ | 7.46±1.53$^{d}$ | 7.64±1.31$^{d}$ |
| SMB5 | 7.84±1.13$^{b}$ | 7.62±1.35$^{b}$ | 7.54±1.22$^{c}$ | 7.72±1.23$^{b}$ | 7.66±1.27$^{b}$ | 7.68±1.24$^{c}$ |

***Note:** SMB 1: 100% Wheat Flour; SMB2: 50% unripe plantain flour +50% wheat; SMB3: 30% unripe plantain flour +70% wheat flour; SMB4: 60% unripe plantain flour+ 40% wheat flour; SMB5: 80% unripe plantain flour +20% wheat flour*

**RESULTS AND DISCUSSION**: Significant differences ($p < 0.05$) were observed among the cake formulations in proximate composition and sensory characteristics. Moisture content ranged from 27.13% in SMB1 to 36.96% in SMB2, while ash content ranged from 1.30% in SMB1 to 2.23% in SMB4. Crude fibre ranged from 0.34% in SMB3 to 3.83% in SMB1. Ether extract ranged from 20.18% in SMB5 to 29.38% in SMB3, while crude protein ranged from 6.04% in SMB1 to 10.05% in SMB2. Carbohydrate content ranged from 28.47% in SMB3 to 43.57% in SMB1. Sensory evaluation showed that all samples were generally acceptable, with mean overall acceptability scores ranging from 7.50 to 8.36. SMB1 recorded the highest overall acceptability (8.36 ± 0.78), followed by SMB2 (7.70 ± 1.06). Although the composite-flour samples recorded lower scores than the control, their mean scores remained above 7.0, indicating good sensory acceptability among the panelists.

**CONCLUSION AND RECOMMENDATION**: The incorporation of unripe plantain flour significantly influenced the proximate composition and sensory characteristics of honey-sweetened cakes. Although the control recorded the highest sensory acceptability, the composite-flour cakes remained generally acceptable to the panelists. The use of wheat–unripe plantain flour blends is therefore recommended for the development of acceptable alternative bakery products, with further studies recommended to optimize the formulation and evaluate micronutrient composition and shelf stability.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Extraction, Characterisation and Application of Alginate from *Sargassum fluitans* as a Stabiliser in Yoghurt Production

**Name of Authors:** *Adeniyi, O.A.[1], Saibu G.M.[1,3], Sobola A.O.[2], Adeyemo A.G. [1], Balogun S.R.[2], Phillips I.[1], Ogundajo A.L.[2,3], and Adu O.B.[1,3]

**Affiliation of Authors:** [1]Department of Biochemistry, Lagos State University, Ojo, Lagos.

[2]Department of Chemistry, Lagos State University, Ojo, Lagos.

**Corresponding author:** adeniyisemilore@gmail.com, 08110468364

**Keywords:** *Sargassum fluitans*, alginate, yoghurt, food stabilizer.

**Highlights**

• Alginate extracted from *Sargassum fluitans* compared with commercial alginate in physicochemical properties.

• Extracted alginate was incorporated into yoghurt improving its viscosity and reduced syneresis.

• This study supports valourisation of invasive marine biomass for food applications.

**BACKGROUND AND OBJECTIVES:** Massive blooms of *Sargassum fluitans* along coastal regions have become an environmental challenge and remain largely underutilised despite their industrial potential. Alginate, a polysaccharide present in brown seaweeds, is widely used in the food industry as a thickening and stabilising agent. This study aimed to extract and characterise alginate from *Sargassum fluitans* obtained from the Badagry coastline in Lagos, Nigeria, and evaluate its potential application as a stabiliser in yoghurt production.

**MATERIALS AND METHODS:** *Sargassum fluitans* was collected from the Badagry coastline, Lagos State, Nigeria. Alginate extraction was carried out using acid pre-treatment, alkaline extraction, and ethanol precipitation. The extracted sodium alginate was subsequently bleached and dried. Fourier Transform Infrared Spectroscopy (FTIR) was used to analyse the structural characteristics of the alginate. Functional properties- moisture content, viscosity, water swelling capacity, water holding capacity, and thickening capacity- were determined using standard analytical procedures. Yoghurt samples containing 0.1% and 0.3% alginate were formulated and evaluated for viscosity, syneresis, and microbiological quality.

**RESULTS AND DISCUSSION:** FTIR analysis confirmed the characteristic functional groups associated with alginate, indicating successful extraction and purification of sodium alginate from *Sargassum fluitans* [1]. The extracted alginate exhibited low moisture content, and viscosity was comparable to commercial alginate. Water swelling capacity suggested good hydration and gel-forming properties. Incorporation of alginate as a stabilizer in yogurt at 0.1% and 0.3% concentrations significantly reduced syneresis and increased viscosity compared to the control, demonstrating its efficacy as a thickening and stabilising agent [2]. The yoghurt samples also showed acceptable microbiological quality, indicating suitability for food application [3].

**Table 1:** Functional Properties of Sodium Alginate extracted from *Sargassun fluitans* Compared to Commercial Alginate

| Parameters of Analysis | Commercial Sodium Alginate | Extracted Sodium Alginate |
|---|---|---|
| Moisture Content (%) | $20.31 \pm 1.97^{a}$ | $7.46 \pm 1.17^{b}$ |
| Viscosity (cps) | $160 \pm 0^{a}$ | $160 \pm 0^{a}$ |
| Water Holding Capacity (g/g) | $2.55 \pm 0.55^{a}$ | $1.94 \pm 0.10^{b}$ |
| Water Swelling Capacity (mL/g) | $3.33 \pm 2.31^{a}$ | $11.3 \pm 2.31^{b}$ |
| Thickening Capacity (cps) | $186.67 \pm 46.19^{a}$ | $186.67 \pm 46.19^{a}$ |

**Values are represented as Mean ± Standard Deviation of triplicate readings. Groups with different letters shows significant difference at P<0.05**

**CONCLUSION AND RECOMMENDATION:** Alginate extracted from *Sargassum fluitans* demonstrated favourable physicochemical and functional properties with promising application as a yoghurt stabiliser. The study highlights the potential utilisation of this invasive marine biomass as a sustainable raw material for the food industry thus contributing to environmental management and food system innovation. Further studies should investigate large-scale extraction processes and broader industrial applications of the extracted alginate.

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**Theme/Sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title: Comparison of Traditional and Ultra-Processed Foods Consumption among Undergraduates of the University of Ibadan, Nigeria.**

**Authors: *Akolade, A. A.[1], Adepoju, O. T.[1]**

**Affiliation of authors:** [1]Department of Human Nutrition and Dietetics, University of Ibadan

***Corresponding author:** akoladeamos2002@gmail.com, +2349074152588

**Keywords: -**Traditional Foods, Ultra-Processed Foods, Nutrition Transition, Dietary Habits

**Highlights**

- Despite high nutrition knowledge, convenience drives ultra-processed food consumption, revealing a critical knowledge-action gap among students.
- Rare consumption of fruits and vegetables, a concerning trend pointing at likely micronutrient deficiencies with long term public health consequences.

**BACKGROUND AND OBJECTİVES:** Food consumption patterns among undergraduates are influenced by urbanisation, globalisation, and lifestyle changes, leading to a shift from traditional diets to ultra-processed foods (UPFs). This dietary transition raises significant public health concerns [1], particularly within the Nigerian university setting. This study therefore, compared the consumption patterns of traditional foods and ultra-processed foods among undergraduates of the University of Ibadan, and examined the associated factors influencing their dietary choices.

**METHODS:** A descriptive cross-sectional study was conducted among 402 respondents selected across nine halls of residence using a multi-stage sampling technique. Data was collected through a structured Food Frequency Questionnaire (FFQ), taking detailed data on socio-demographic characteristics, nutrition knowledge and anthropometric measurements such as height, weight, and body mass index (BMI), and analysed using SPSS version 26.

**RESULTS AND DISCUSSION:** Majority (84.6%) of respondents were Yoruba, and 13.0% Igbo. There were more male participants (53.2%) than female (46.8%). The mean BMI was 21.3±2.53 kg/m$^2$, indicating a generally healthy nutritional status among the respondents. Cereals and grains, particularly boiled rice and jollof rice, were commonly consumed staples, while garri was the most consumed root and tuber food, with 21.1% eating it daily. Legumes including cooked beans and *moimoi* were moderately consumed, reflecting their affordability and protein value. Egg, fish, and fish products were the most frequently consumed animal-source foods, with 26% and 43% consuming boiled eggs and fried fish daily, respectively. However, fruits and vegetables were rarely consumed — a significant nutritional gap. Ultra-processed foods, particularly carbonated drinks, powdered milk, and processed snacks, were increasingly integrated into student diets. Despite high nutrition knowledge (92.8%) and positive perceptions of traditional foods (88.9%), convenience and accessibility influenced ultra-processed foods consumption. Ethnicity, gender, and nutrition awareness significantly shaped food choices, with male students consuming more UPFs than females.

**CONCLUSION AND RECOMMENDATION(S):** While highlighting the dominance of traditional foods, ongoing nutrition transition among university students underscores the need for promoting traditional food consumption. Enhancing nutrition education, improving access to healthier meal options

on campus, and supporting policies that preserve indigenous food systems that are affordable, accessible, and available are recommended for better health of undergraduate students.

**Table 1: Frequency of Consumption of Selected Traditional and Ultra-Processed Food Item**

| **Food Item** | **Rarely (%)** | **Once/wk (%)** | **2-3x/wk (%)** | **4-5x/wk (%)** | **Daily (%)** |
|---|---|---|---|---|---|
| **Cereals and Grains** | | | | | |
| Boiled Rice | 4.2 | 7.8 | 36.2 | 36.2 | 15.6 |
| Jollof Rice | 18.0 | 23.9 | 38.9 | 14.7 | 4.6 |
| **Roots and Tubers** | | | | | |
| Garri | 11.9 | 12.5 | 26.1 | 28.4 | 21.1 |
| **Legumes and Pulses** | | | | | |
| Cooked Beans | 16.6 | 28.8 | 33.1 | 16.6 | 5.0 |
| Beans Pudding (Moimoi) | 45.2 | 38.6 | 9.9 | 4.3 | 2.0 |
| **Egg, Fish and Fish Products** | | | | | |
| Boiled Egg | 0.0 | 21.1 | 36.2 | 16.8 | 26.0 |
| Fried Fish | 0.0 | 19.8 | 24.5 | 13.4 | 42.3 |
| **Fruits and Vegetables** | | | | | |
| Orange | 49.7 | 25.2 | 17.5 | 4.3 | 3.3 |
| Plantain | 39.6 | 20.1 | 23.4 | 13.2 | 3.6 |
| **Ultra-Processed Foods** | | | | | |
| Powdered Milk | 29.0 | 20.8 | 30.7 | 12.5 | 6.9 |
| Coke | 44.7 | 27.3 | 17.4 | 7.2 | 3.3 |

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Sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition

Title: Nutritional properties of *kunu zaki* produced from blends of pearl millet, pigeon pea, and soybean

*Olufadeju J. O[1]., Akinjomo, A. E[1]., Omisore, B. I[2]., and Ayeni, R. A[3]

[1]Nutrition and Dietetics Department, The Federal Polytechnic, Ilaro

[2]Federal University of Health Sciences, Ila-Orangun

[3]Lens Polytechnic, Offa, Kwara.

Olujosh10@gmail.com, +2348123126358

Kunu zaki, microbial analysis, Local ingredients

HIGHLIGHTS OF THE STUDY

- The study demonstrated that legume fortification improved the nutritional quality of the traditional cereal-based beverage
- Promoted the utilization of underutilized indigenous crops to enhance dietary diversification and food security.

BACKGROUND AND OBJECTIVE

*Kunu zaki* is a traditional non-alcoholic fermented cereal beverage widely consumed in Nigeria, especially in the northern region, due to its refreshing taste, affordability, and thirst-quenching properties. However, conventional *kunu zaki* is predominantly carbohydrate-based and contains relatively low levels of protein and essential micronutrients, limiting its nutritional contribution Olaoye et al., (2015). Therefore, this study evaluated the nutritional properties of *kunu zaki* produced from blends of pearl millet, pigeon pea, and soybean

MATERIALS AND METHODS

Raw materials were sourced from local markets and processed into four *kunu zaki* formulations at pearl millet: pigeon pea: soybean ratios of 100:0:0, 75:20:5, 75:15:10, and 75:5:20 for samples A–D, respectively. The formulated *kunu zaki* samples were analyzed for proximate composition and microbial analysis using standard methods AOAC (2006). Data were analyzed using SPSS version 27, and mean differences were determined using Duncan's multiple range test.

RESULTS AND DISCUSSION

The moisture content ranged from 87.28% to 89.15%, with Sample A recording the highest value. Sample D had the highest fat (4.03%), ash (1.49%), crude fibre (1.56%), and carbohydrate (4.52%) contents. However, the protein content obtained in this study was lower than the 11.88–13.68% reported by Ikechukwu et al. 2024, which may be attributed to differences in the raw materials and formulation used.

Table 1: Proximate composition of the Formulated Kunu zaki

| Samples | Moisture (%) | Fat (%) | Ash (%) | Crude fibre (%) | Crude protein (%) | Carbohydrate (%) |
|---|---|---|---|---|---|---|
| A | 89.15±0.04$^{d}$ | 2.43±0.02$^{a}$ | 0.85±0.04$^{a}$ | 1.14±0.01$^{a}$ | 6.20±0.03$^{a}$ | 0.24±0.03$^{a}$ |
| B | 88.08±0.06$^{c}$ | 3.69±0.01$^{b}$ | 1.19±0.01$^{b}$ | 1.39±0.01$^{b}$ | 8.67±0.04$^{b}$ | 3.02±0.14$^{b}$ |
| C | 87.71±0.04$^{b}$ | 3.84±0.02$^{c}$ | 1.33±0.01$^{c}$ | 1.43±0.01$^{c}$ | 9.30±0.03$^{c}$ | 3.61±0.06$^{c}$ |
| D | 87.28±0.04$^{a}$ | 4.03±0.02$^{d}$ | 1.49±0.01$^{d}$ | 1.56±0.01$^{d}$ | 10.17±0.04$^{d}$ | 4.52±0.11$^{d}$ |

The total plate count of the formulated kunu zaki ranged from $1.25 \times 10^4$ to $3.05 \times 10^4$ CFU/g across samples A to D. Sample D recorded the highest total coliform count ($3.25 \times 10^2$ CFU/g) and total fungi count ($2.85 \times 10^3$ CFU/g). These findings are consistent with those reported by Amusa et al (2020), who observed comparable bacterial and fungal counts in similar formulations. Furthermore, all the formulated kunu zaki samples were within the acceptable microbiological limits recommended by ICMSF (2011), indicating that they were microbiologically safe for consumption.

Table 2: Microbial analysis of the formulated Kunu zaki

| SAMPLES | TOTAL PLATE COUNT (Cfu/g) | TOTAL COLIFORM COUNT (Cfu/g) | TOTAL FUNGI COUNT (Cfu/g) |
|---|---|---|---|
| A | 1.25 x $10^4$±0.07$^{a}$ | 2.05 x $10^2$±0.07$^{a}$ | 1.15 x $10^3$±0.07$^{a}$ |
| B | 2.15 x $10^4$±0.07$^{b}$ | 2.35 x $10^2$±0.07$^{b}$ | 1.85 x $10^3$±0.07$^{b}$ |
| C | 2.30 x $10^4$±0.42$^{b}$ | 2.75 x $10^2$±0.42$^{c}$ | 2.35 x $10^3$±0.42$^{c}$ |
| D | 3.05 x $10^4$±0.07$^{c}$ | 3.25 x $10^2$±0.07$^{d}$ | 2.85 x $10^3$±0.07$^{d}$ |

## CONCLUSION AND RECOMMENDATION

The study demonstrated that *kunu zaki* produced from blends of pearl millet, pigeon pea, and soybean possesses improved nutritional quality while maintaining acceptable microbiological safety. The study therefore recommends that sample D is most preferable due to its nutritional quality.

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**Sub-theme:** Transforming local food systems for improved food security and nutrition

**Title:** Unveiling the mineral diversity of under-utilized legumes in Southern Nigeria: Implications for human nutrition and food security

**Name of Authors:** *Ugwu, J.C., Shokunbi, O.S., and Kayode, A.A.A.

**Affiliation of Authors:** Department of Biochemistry, School of Basic Medical Sciences, Babcock University, Ilishan-Remo, Ogun State, Nigeria

*Corresponding Author's Details: justinaugwu24@gmail.com, +2348080676370

**Keywords:** African breadfruit seed, African yam bean, Bambara, Pigeon pea

**Highlights:** - Under-utilized legumes in Southern Nigeria are rich in macro- and microminerals

- The mineral contents of these legumes vary widely across the Southern Nigeria

**Background and Objective:** Under-utilized legumes are a group of legumes that are grown less than other comparable legumes and are not commonly consumed by a large percentage of the populace. Mineral deficiency and food safety are significant public health concern especially in a developing country as Nigeria. Other research works had been on the nutritional composition of these under-utilized legumes in a few states of the country [1][2]. This research, thus, determined the mineral diversity of selected under-utilized legumes across the Southern Nigeria.

**Materials and Methods:** Raw African yam bean seed (AYB), Bambara nut (BMB), pigeon pea (PGP) and African breadfruit seed (ABS) were purchased from six randomly selected sellers in open markets within each of the three geopolitical zones in Southern Nigeria. The minerals were measured using inductively coupled plasma-optical emission spectrophotometer (ICP-OES) according to AOAC method (2015.01), after wet digestion. Mean values were compared across zones and level of significant difference were established at $p < 0.05$.

**Results and Discussion:** Table 1 shows that African yam bean seed was the richest in Fe and Mn; Bambara nut was the richest in Mg; and pigeon pea was the richest in Ca, K, and Cu. The concentrations of many of the minerals obtained fell within the range previously reported for the legumes [3].

**Table 1: Mineral contents (mg/kg dry weight) of selected under-utilized legumes in Southern Nigeria**

| Mineral | Legume | South-West | South-East | South-South |
|---|---|---|---|---|
| Ca | AYB | 491 ± 11.6[a] | 585 ± 19.6[a] | 661 ± 238 [a] |
| | BMB | 260 ± 29.1 [a] | 282 ± 20.6 [a] | 425 ± 93.2 [a] |
| | PGP | 1190 ± 418[b] | 877 ± 54.0[a] | NA |
| | ABS | 502 ± 2.60[a] | 530 ± 23.9[a] | NA |
| K | AYB | 14300 ± 647 [a] | 15000 ± 1340 [a] | 15100 ± 217 [a] |
| | BMB | 13600 ± 976[a] | 14100 ± 147[a] | 13400 ± 257 [a] |
| | PGP | 16600 ± 454[a] | 17400 ± 29.6 [a] | NA |
| | ABS | 3530 ± 11.6[a] | 5960 ± 264[a] | NA |
| Mg | AYB | 8310 ± 648[b] | 5330 ± 281[a] | 7090 ± 577[a,b] |
| | BMB | 6980 ± 240[a] | 7760 ± 801[a] | 7210 ± 1010 [a] |
| | PGP | 4890 ± 1910[a] | 6010 ± 224 [a] | NA |
| | ABS | 6370 ± 18.1[a] | 7070 ± 47.5 [a] | NA |

| **Mineral** | Legume | South-West | South-East | South-South |
|---|---|---|---|---|
| Na | AYB | 223 ± 55.5[b] | 132 ± 5.93[a] | 67.3 ± 18.8[a] |
| | BMB | 84.3 ± 30.9[b] | 138 ± 74.7[b] | 57.0 ± 4.70[a] |
| | PGP | 174 ± 22.2[b] | 100 ± 16.3[a] | NA |
| | ABS | 131 ± 1.30[a] | 221 ± 36.1[b] | NA |
| P | AYB | 257 ± 95.4 [a] | 961 ± 131[b] | 121 ± 8.42[a] |
| | BMB | 102 ± 8.23[a] | 106 ± 6.25 [a] | 255 ± 136 [a] |
| | PGP | 455 ± 337[a] | 397 ± 43.9 [a] | NA |
| | ABS | 105 ± 1.14[a] | 434 ± 14.4 [b] | NA |
| Cu | AYB | 3.57 ± 0.461[a] | 9.08 ± 2.15[b] | 6.61 ± 2.22 [a, b] |
| | BMB | 3.35 ± 0.553[a] | 5.94 ± 0.087[a] | 3.64 ± 0.124 [a] |
| | PGP | 9.36 ± 0.588[a] | 11.0 ± 0.280 [a] | NA |
| | ABS | 5.46 ± 0.130[a] | 10.3 ± 1.70[b] | NA |
| Fe | AYB | 152 ± 7.53 [a, b] | 192 ± 15.4[b] | 98.9 ± 31.4[a] |
| | BMB | 51.6 ± 6.73[a] | 164 ± 20.3[b] | 15.3 ± 7.39[a] |
| | PGP | 78.4 ± 18.8[a] | 99.7 ± 40.7 [a] | NA |
| | ABS | 310 ± 2.90[b] | 160 ± 9.81[a] | NA |
| Mn | AYB | 22.0 ± 2.34[a] | 25.2 ± 0.459 [a] | 20.8 ± 1.80 [a] |
| | BMB | 20.0 ± 2.04 [a] | 18.0 ± 0.305 [a] | 13.9 ± 1.10[a] |
| | PGP | 16.2 ± 4.69[a] | 21.1 ± 0.168 [a] | NA |
| | ABS | 12.7 ± 0.079[a] | 15.1 ± 0.612[a] | NA |

Values represent mean ± standard deviation, n = 6. Values with different superscript on same row are significantly different at $p < 0.05$. AYB = African yam bean seed, BMB = Bambara nut, PGP = Pigeon pea, ABS = African breadfruit seed. NA = Not available for sampling

**Conclusion and Recommendation:** The under-utilized legumes are very rich in macro- and microminerals. However, the minerals varied widely across legumes and the zones. There is a need for more menus and products to be developed with these legumes to enhance patronage and food security in Nigeria.

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**Theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems & Sectors.

**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition.

**Title:** Bioactive, Amino Acids and Fatty Acid Composition of *Cissus populnea* Soup Meal.

**Name of Author(s):** *Agada, V. A.[1], Ukam, N. U.[2] and Ekpenyong, E. E.[1]

**Affiliation of Author(s):** [1]Department of Biochemistry, University of Calabar, Cross River State, Nigeria.

[2]Department of Human Nutrition and Dietetics, University of Calabar, Cross River State, Nigeria.

***Corresponding author, e-mail:** victoriaagada484@gmail.com, +2347036741804.

**Keywords:** *Cissus populnea*, Okoho soup, bioactive compounds, indigenous food.

**Highlights**

- Okoho soup showed a complete essential amino acid profile with dominant glutamic acid
- Alkaloids (30.00mg) and tannins (0.05mg) were the highest and lowest phytochemicals.
- Oleic and alpha-linolenic acids were the major unsaturated fatty acids.

## BACKGROUND AND OBJECTIVES

Soups are among the oldest relishes of man, serving as a source of strength for individuals recovering from illness, particularly those unable to consume solid foods [1]. Cissus populnea is a medicinally valued plant, rich in carotenoids, triterpenoids and ascorbic acid, and possessing active phytochemicals such as tannins, glycosides, flavonoids and vitamin C [2]. Despite its traditional use, including in sickle cell disease management, the bioactive, amino acid and fatty acid composition of Okoho soup remains inadequately documented. This study therefore investigated these properties in Cissus populnea soup meal.

## MATERIALS AND METHOD

Okoho stem (Cissus populnea), Okpehe (processed locust beans), Abafu (moulded melon), Citrullus lanatus, mushrooms, bitter eggplant, crayfish, venison, goat meat, fresh pepper, seasoning cubes, salt, dried fish and egg were sourced from local markets in Otukpo (Benue State) and Calabar (Cross River State), Nigeria. Bioactive content was determined by the Folin-Denis titrimetric method (Pearson, 1974); amino acids by HPLC after acid hydrolysis; and fatty acids by GC-MS after oil methylation.

## RESULTS AND DISCUSSION

Bioactive composition of the soup meal is in Table 1. Tannins recorded the lowest quantitative value (0.05mg), significantly different ($P<0.05$) from other phytochemicals, while alkaloids recorded the highest (30.00mg). Qualitatively, phytate and alkaloids were abundant, saponins and flavonoids were moderate, while phenols, tannins, terpenoids, glycosides and oxalate occurred in trace amounts.

Amino acid profiling identified glutamic acid as dominant (12.91g/100g), followed by leucine (8.23g/100g) and arginine (6.67g/100g). All essential amino acids were present: threonine, phenylalanine, isoleucine, valine, lysine, methionine and tryptophan (range 1.15-5.33g/100g). Fatty acid analysis showed lignoceric (C24:0) and tricosanoic (C23:0) acids as most abundant (68.33mg, 68.32mg). Among unsaturated fatty acids, oleic acid was highest (57.98mg), while alpha-linolenic acid, an essential omega-3, was detected at 49.46mg.

**Table 1: Bioactive composition of Cissus populnea soup meal**

| Phytochemical | Quantitative Value (mg/100g) | Qualitative Level |
|---|---|---|
| Saponin (mg/100g) | 2.00 ± 0.03 | ++ |
| Tannins (mg/100g) | 0.05 ± 0.02 | + |
| Flavonoids (mg/100g) | 2.06 ± 0.02 | ++ |
| Alkaloids (mg/100g) | 30.00 ± 0.43 | +++ |
| Terpenoids (mg/100g) | 1.96 ± 0.05 | + |
| Phytate (%) | - | +++ |
| Oxalate (mg/g) | - | + |
| Polyphenols | - | + |

Key: += trace; ++ = moderate; +++ = high; - = not quantified. Values are means ± SD.

## CONCLUSION AND RECOMMENDATION(S)

Okoho soup is a nutritionally rich traditional food with a complete essential amino acid profile and beneficial unsaturated fatty acids. These findings provide baseline data to support dietary counselling, food labelling and wider promotion of this indigenous soup. Sensory evaluation of similar Okoho soup varieties is recommended for further study.

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**Theme/Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title**: Small fish species can fill the nutrient gaps of young children and pregnant women in Nigeria: Implication for Agricultural Policies

**Authors**: *Ene-Obong, H.N.[1], Esate, J.[2], Tolar-Peterson,T.[3], Pincus, L.[4], Pasqualino, M.[5]

**Affiliation of Authors**: [1]Department of Human Nutrition and Dietetics, University Calabar, Calabar, Nigeria. [2]Department of Biochemistry, University of Calabar, Calabar, Nigeria; [3]Department of Food Science, Nutrition, and Health Promotion, Mississippi State University, USA; [4,5]World Fish Lenang, Malaysia.

***Corresponding autho**r: email: nkeneobong@gmail.com; +2348036754151

**Keywords:** Animal source foods, contribution to requirements, cost-effectiveness, children (6-23 months), pregnant women

**Highlights**

- Small fish species (SFS) can fill the nutrient gaps of young children and pregnant women
- Evidence-based data provided for informed ASF choices, and nutrition interventions.
- Agricultural policies should prioritize SFS production: wild capture fisheries & aquaculture

**BACKGROUND AND OBJECTIVES**: The National Food Consumption and Micronutrient Survey [1] among WRA and children 24-59 months showed serious inadequacies in the intake of folate, calcium, iron, zinc, vitamins A, B group and C, as well as poor dietary diversity. Animal source foods (ASFs) contribute significantly to a balanced human diet, especially where meals are largely starch-based and lack diversity [2]. However, they are poorly or infrequently consumed and unaffordable because of their high cost, among other reasons [3]. We estimated the contributions of ASFs to nutrient requirements and cost per nutrient to determine their cost-effectiveness in meeting the requirements of pregnant women (PW) and infants and young children (IYC), to guide informed food selection and dietary interventions.

**MATERIALS AND METHODS:** A one-year market survey was conducted to determine prices of ASFs in Delta State, Nigeria. Processed fish products (PFPs) sold in purposively selected markets and from randomly selected vendors were purchased, prepared in forms commonly consumed, and analysed for their nutrient contents using standard procedures. Contributions and cost-per-nutrient relative to the nutrient requirements of the target groups were estimated using portion sizes of 25g for IYC and 50g for WRA [4, 5]. Results are presented using descriptive statistics.

**RESULTS AND DISCUSSION**: PFPs, particularly those eaten whole like the SFS, e.g., "bonga" (*Ethmalosa fimbriata),* clupeid (*Pellonula Afzelius),* and crayfish (*Nematopalaemon hastatius*) are more nutrient-dense than other ASFs, contributing ≥ 50% to protein, calcium, iodine and folate requirements of IYC and PW. Iron and zinc were the most expensive micronutrients irrespective of the source. The SFS compared favourably with beef liver and lean beef in meeting iron and zinc requirements.






Bonga (*Ethmalosa fimbriata*) Smoked-dried & sun-dried (*Pellonula Afzelius)* Crayfish

**CONCLUSION AND RECOMMENDATIONS:** SFS can be used as a sustainable alternative for ASFs as they can fill the protein and other nutrient gaps in the diets of PW and IYC, especially when combined with other nutrient-dense ingredients. The results of this study could serve as a guide for informed food selection and dietary interventions. Agricultural policies should include wild-captured fisheries and aquaculture to promote species diversification and their consumption in order to improve nutritional outcomes of women and children.

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**SUB THEME 1: Transforming Local Food Systems for Improved Food Security and Nutrition Production and Evaluation of the Nutritional and organoleptic properties of Instant Ready-to-Serve Zobo Mix Beverage.**

**Ukegbu, P.O[1], Onwuzuruike, A.U[2], Atowa, A.G[1], and Okereke, I.F[1], Ikpemo K[1], Sopuru, J[1], Ogah, M[3], Okwunodulu, C.C[1].**

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria.

[2]Department of Food Science and Technology, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria

[3]Department of Home Economics, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria.

**Corresponding author'email:**(atowagift@gmail.com)

**Keywords: Hibiscus sabdariffa, instant powder, proximate, sensory evaluation.**

**Highlight:** Good levels of phytochemicals and antioxidants in the ready-to-serve zobo mix were retained, making it a health-promoting beverage.

**Background and objectives**

Zobo is a nutritional drink consumed by different classes of people irrespective of socio-economic status, sex and age in Nigeria [1]. The demand for zobo drink is due to its low price, nutritional and medicinal properties [2]. Freshly prepared zobo has limited shelf-life due to high moisture content and microbial susceptibility, often requiring refrigeration or immediate consumption. This presents a significant processing and distribution challenge, especially in rural or low-resource settings without access to consistent cold chains. Therefore, the purpose of this study is to develop an instant ready-to-serve zobo mix beverage by dehydration, and pulverisation methods and subjecting it to quality evaluation to establish its nutritional, and sensory qualities.

**Materials and methods**

An experimental study design was employed and raw materials used in this study include: Hibiscus sabdariffa calyces, date fruits, beetroot, ginger, cloves. The materials were procured in Ndoro market, Ikwuano Local Government Area, Abia State.Five instant zobo formulations were developed: Control (Sample AG), and Sample (BG CG, DG, EG) with varying amount of Gum Arabic. Proximate composition was determined using AOACmethods. Total Phenolic Content (TPC) and Total Flavonoid Content (TFC) were quantified spectrophotometrically and expressed as mg Gallic Acid Equivalent/g and mg Quercetin Equivalent/g respectively. Sensory evaluation was conducted by 30 untrained panelists using a 9-point hedonic scale. Data were subjected to ANOVA and means separated using Duncan's Multiple Range Test at $p<0.05$.

## Results and Discussion

Proximate analysis showed moisture (5.68-6.28%), protein (6.38-8.12%), fat (1.90-2.60%), crude fibre (8.30-11.20%), ash (5.18-6.17%) and carbohydrate (66.09-72.36%). Sample BG recorded the highest protein, fibre and ash, while Sample EG had the highest carbohydrate. The low moisture content suggests good storage stability and reduced microbial spoilage. Antioxidant properties revealed TPC ranging from 49.18 mg GAE/g in Sample AG to 79.12 mg GAE/g in Sample BG, while TFC ranged from 24.81 mg QE/g in Sample AG to 43.76 mg QE/g in Sample BG.Antioxidant activities followed a similar pattern. The control (Sample AG) had the lowest antioxidant activity across all assays. Sensory results showed that the control was most preferred in appearance, mouthfeel, taste and overall acceptability. Among other samples, DG was the most accepted in appearance, aroma, mouthfeel, taste and overall acceptability, and was not significantly different ($p>0.05$) from the control in aroma, taste and overall acceptability.

**Table 4.1 Sensory evaluation of instant ready-to-serve Zobo drink (Mean ± SD)**

| Sample | Appearance | Aroma | Mouthfeel | Taste | Overall Acceptability |
|---|---|---|---|---|---|
| AG | **7.67 ± 1.35$^{a}$** | 6.40 ± 1.63$^{a}$ | **6.80 ± 1.71$^{a}$** | **6.03 ± 1.90$^{a}$** | **6.83 ± 1.32$^{a}$** |
| BG | 6.70 ± 2.22$^{b}$ | 5.87 ± 1.57$^{a}$ | 3.70 ± 1.73$^{c}$ | 4.13 ± 1.59$^{c}$ | 4.90 ± 1.54$^{d}$ |
| CG | 6.70 ± 1.95$^{b}$ | 5.90 ± 1.63$^{a}$ | 4.10 ± 2.01$^{c}$ | 4.30 ± 2.04$^{bc}$ | 5.33 ± 1.83$^{cd}$ |
| DG | 7.43 ± 1.28$^{ab}$ | 6.43 ± 1.52$^{a}$ | 5.77 ± 2.01$^{b}$ | 5.80 ± 1.79$^{a}$ | 6.47 ± 1.28$^{ab}$ |
| EG | 6.77 ± 1.48$^{ab}$ | 6.30 ± 1.60$^{a}$ | 5.23 ± 1.83$^{b}$ | 5.17 ± 1.53$^{ab}$ | 5.93 ± 1.34$^{bc}$ |

Values are mean ± standard deviation of samples.$^{a-d}$ Means with different superscript letters within the same column differ significantly ($p>0.05$). **Key:**AG: Sample without Gum Arabic (Control),BG, CG,and DG and EG: Samples with Gum Arabic.

## Conclusion

This study confirms that the instant ready-to-serve zobo mix beverage that was formulated is a viable innovation for transforming local food systems. It improves food security by ensuring availability and reducing losses, enhances nutrition security by delivering antioxidants and essential nutrients, and promotes economic empowerment through value addition.

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**SUB-THEME:** TRANSFORMING LOCAL FOOD SYSTEMS FOR IMPROVED SECURITY AND NUTRITION

**TITLE:** MICROBIAL LOAD, QUALITY OF STREET FOODS, AND HYGIENE PRACTICES OF FOOD VENDORS IN OSHOGBO LOCAL GOVERNMENT, OSUN STATE

Ajiboye, A.I.[1], Kayode, O.O.[1], *Ogundoyin, O.S.[2]

[1]Department of Human Nutrition and Dietetics, Faculty of Basic Medical Sciences, Osun State University, Oshogbo, Nigeria.

[2]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Nigeria.

***Corresponding author**: oyinkanogundoyin2020@gmail.com , +2348149300707

**HIGHLIGHTS**

- Only 31.6% of street food samples met high-quality standards
- Mobile-vended foods exceeded ICMSF and NAFDAC safety limits
- Fufu samples recorded the highest microbial contamination levels

**BACKGROUND AND OBJECTIVES**

Street food is a major source of affordable and readily available nutrition to urban dwellers of developing countries such as Nigeria and plays a significant role in the dietary consumption of consumers who rely on street food vending for their daily meals [1]. However, the informal structure of this sector, coupled with weak regulatory oversight, exposes consumers to significant risk of microbial contamination, foodborne illness and inconsistent hygiene practices by the vendors [2, 3]. This study, therefore aimed to assess the microbial load, quality of street food and safety practices of vendors in Oshogbo local government, Osun State

**MATERIALS AND METHODS**

Using a multistage sampling, this cross-sectional study surveyed 152 street food vendors in Osogbo local government, Osun State into strata: Stationary sellers with shelter, stationary without shelter and mobile sellers. Data were collected using a pre-tested interviewer-administered semi-structured questionnaire and direct observation. Microbiological analysis of 24 street food samples was conducted to determine microbial load, using total plate count following serial dilution and spread-plate/pour-plate techniques. Data were analyzed using IBM SPSS version 27.0, association were tested by chi-square at $p \leq 0.05$.

**RESULTS**

Out of the 152 vendors surveyed, majority were female (96.1%) with secondary education (40.1%), and 56.6% lacked proper food safety training. Most vendors (60.5%) operated in clean environments, yet 21.7% used hair coverings and 90.1% did not wear aprons. Microbial analysis showed high contamination levels, particularly in fufu. Several mobile vended samples exceeded the ICMSF and NAFDAC limit with no significant relationship between food types and quality

($p \leq 0.05$). Hygiene practices and vendor characteristics showed no significant associations with food quality. The high microbial contamination observed despite generally clean vending environments suggests that environmental cleanliness alone is insufficient to ensure food safety. The low use of hair coverings and aprons, coupled with the lack of formal food safety training among many vendors, may have increased the risk of food contamination [4]. These findings highlight the need for strengthened food safety training and more effective enforcement of food safety regulations to protect public health [2].

**Table 1: Selected hygiene and food quality indicators among vendors (n= 152)**

| Hygiene/observation indicator | Percentage |
|---|---|
| **Clean operative environment** | 60.5 |
| **Secondary education** | 40.1 |
| **No access to water and soap** | 77.6 |
| **No food safety training** | 56.6 |
| **Handles food with bare hands** | 50.7 |
| **Hair not covered** | 78.3 |
| **Use of apron** | 9.9 |
| **High-quality food samples (n=24)** | 31.6 |
| **Low-quality food samples (n=24)** | 68.4 |

## CONCLUSION AND RECOMMENDATION(S)

This study found significant gap in the microbial safety, quality and hygiene of street food in Oshogbo local government, with two-third of samples being of low quality. Inadequate hygiene practices and high microbial loads in traditional foods like fufu highlight the need for improved handling and storage. Government and NGOs should develop food safety campaigns, fund training programs, and enforce regulations. Local authorities need to conduct routine inspections and provide access to resources like clean water and sanitation facilities, while street food vendors should adapt basic safety and hygiene practices to safeguard consumer health.

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**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title: Interventions to Improve Fruit and Vegetable Availability, Quality and Intake in Low- and Middle-Income Countries: A Scoping Review with Implications for Nigeria**

**Author(s):** *Adegbuyi, K.O.[1], Alasan, O.R.[2], and Olotu, O.A.[3]

**Affiliation:** [1]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan. [2]Department of Health Promotion and Education, College of Medicine, University of Ibadan, Ibadan, Nigeria.

[3]School of Biological Sciences, University of Reading, United Kingdom.

*Corresponding author, e-mail: adegbuyikenny@gmail.com, +2347066957609

**Keywords:** Fruits and vegetables; food systems; nutrition interventions; low- and middle-income countries

**Highlights**

- Multicomponent food system interventions outperformed single-component ones
- Vouchers raised weekly household fruit and vegetable purchases by 28%
- Agricultural interventions alone rarely improved intake without education

**BACKGROUND AND OBJECTIVES:** Fruit and vegetable (FV) consumption in low- and middle-income countries (LMICs) remains below the World Health Organization recommendation of 400 g/day, contributing to over 3.5 million deaths annually [1]. In sub-Saharan Africa, inadequate production, post-harvest losses, poor market access, affordability constraints and limited nutrition knowledge continue to limit FV availability and intake. This scoping review mapped interventions to improve FV availability, quality and intake in LMICs, synthesised evidence on their effectiveness, and identified implications for strengthening food systems and nutrition programming in Nigeria.

**MATERIALS AND METHOD:** The review followed the Arksey and O'Malley framework. PubMed and the WHO Global Index Medicus were searched for studies published between January 2010 and March 2025 using MeSH and free-text terms for fruits and vegetables, interventions, outcomes and LMICs. Of 1,808 records identified, 36 duplicates were removed, 1,772 were screened by title and abstract and 220 at full text, yielding 31 included studies. Quality was assessed using design-appropriate tools (CASP). Owing to methodological heterogeneity, findings were synthesised thematically rather than by meta-analysis.

**RESULTS AND DISCUSSION:** Thirty-one studies published between 2012 and 2025 were included, 73% from 2019 onwards. Fourteen were conducted in Africa, ten in Asia, two in Latin America and five across multiple LMICs. Nigeria contributed the highest number (n=6), followed by South Africa (n=5) and India (n=3). Eight major intervention categories were identified, with representative findings in Table 1.

**Table 1: Intervention categories and representative findings from 31 included studies**

| Intervention category | n | Illustrative findings |
|---|---|---|
| School nutrition education | 5 | Daily vegetable intake rose from 2% to 49% in adolescents |
| Financial incentives | 4 | Household FV purchases rose 28%, and 104% at scheme retailers |
| Food system and market | 4 | Better market access cut post-harvest losses by up to 92% |
| Community gardening | 3 | FV intake frequency rose by 13% versus matched controls |
| Multicomponent packages | 3 | Ibadan adults consumed 144 g/day more FV than controls [2] |
| Workplace/market access | 2 | Convenience-vegetable buyers ate more than non-buyers |
| Biofortification | 2 | Nutrient-dense crops improved micronutrient availability |
| Policy interventions | 3 | FV insufficiently prioritised in national policies |

Multicomponent food system approaches consistently produced stronger improvements in intake than single-component interventions, with positive effects in 61% of comparisons against 56% for nutrition communication alone, while interventions targeting fruits and vegetables specifically achieved the highest success rate at 72% [3]. Common barriers included affordability, seasonality, poor market infrastructure, limited physical access, cultural preferences and inadequate nutrition knowledge.

**CONCLUSION AND RECOMMENDATIONS:** Improving fruit and vegetable availability, quality and intake require integrated food system interventions rather than isolated programmes. For Nigeria, affordability measures should be combined with nutrition education and improved retail access; investments in post-harvest handling and market infrastructure should be strengthened; and fruits and vegetables should be explicitly prioritised within agriculture, nutrition and social protection policies. More implementation research is needed across underserved populations and settings.

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**SUB-THEME:** TRANSFORMING LOCAL FOOD SYSTEMS FOR IMPROVED FOOD SECURITY AND NUTRITION

**TITLE:** ASSESSMENT OF CONSUMPTION PATTERN OF ANTIOXIDANT-RICH FOODS AMONG MIDDLE-AGED ADULTS IN SOME SELECTED LOCAL GOVERNMENT AREAS IN KATSINA STATE.

**NAME OF AUTHORS**: *Abubakar H. A[1]

**AFFILIATION OF AUTHORS**: [1]Department of Nutrition and Dietetics, College of Science and Technology, Hassan Usman Katsina Polytechnic, Katsina.

*Corresponding Author: hadiza.abubakar.anka@hukpoly.edu.ng +2349036285001, +2349094269414

**KEYWORDS:** Antioxidant-rich foods, consumption, income, middle-aged adults

**HIGHLIGHTS:**

- Respondents with higher incomes consumed antioxidant-rich foods more frequently than those with lower incomes.
- There is no significant difference in the frequency of consumption of antioxidant-rich foods among respondents across Katsina, Daura, and Funtua Local Government Areas
- Food availability (78.2%), household income (76.8%), and the cost of antioxidant-rich foods (76.8%) were identified as the major determinants of consumption.

**BACKGROUNG AND OBJECTIVES:**

The consumption of antioxidant-rich foods has become an important nutritional strategy to promote health and prevent oxidative stress-related diseases. Such foods include those high in vitamins C and E, carotenoids, flavonoids, selenium, and polyphenols [4]. Regular intake of these foods is associated with improved immune function, delayed aging, and enhanced metabolic health [2]. However, in many developing countries, including Nigeria, dietary habits are changing rapidly due to urbanization, modernization, and lifestyle transitions, leading to decreased consumption of fruits and vegetables and increased preference for processed and fast foods [3].

Middle-aged adults, typically between the ages of 35 and 59 years, constitute a significant portion of the productive population and are often at a critical stage in life where the risk of developing chronic diseases increases (World Health Organization [5]. At this stage, maintaining a healthy diet, particularly one rich in antioxidants, is essential for the prevention of diseases and promotion of long-term well-being. However, dietary patterns among this group may be influenced by several factors such as income, education, occupation, cultural beliefs, food availability, and level of nutrition knowledge [1]

This study aimed at assessing the consumption pattern of antioxidant-rich foods among middle-aged adults in some selected local government areas in Katsina State.

**MATERIALS AND METHOD:**

A cross-sectional descriptive survey design was adopted. A total of 142 respondents were selected using a multistage sampling technique involving purposive, simple random, and systematic sampling procedures.

Data were collected using a structured questionnaire and analyzed using descriptive statistics (frequencies and percentages) and inferential statistics comprising Pearson Chi-Square, Spearman Rank Correlation, and One-Way Analysis of Variance (ANOVA) at a 5% level of significance.

**RESULTS AND DISCUSSION:**

The findings revealed a significant positive relationship between monthly income and the consumption of antioxidant-rich foods ($\chi^2 = 24.263$, $p = 0.0005$; $r_s = 0.396$, $p < 0.001$), indicating that respondents with higher incomes consumed antioxidant-rich foods more frequently than those with lower incomes. The study further found no significant difference in the frequency of consumption of antioxidant-rich foods among respondents across Katsina, Daura, and Funtua Local Government Areas ($F = 0.036$, $p = 0.9647$). Similarly, no significant difference was observed in the factors influencing consumption across the three locations ($p > 0.05$). Food availability (78.2%), household income (76.8%), and the high cost of antioxidant-rich foods (76.8%) were identified as the major determinants of consumption.

**CONCLUSION AND RECOMMENDATIONS:**

The study concluded that household income is a key predictor of antioxidant-rich food consumption among middle-aged adults in Katsina State, while geographical location does not significantly influence consumption patterns. It recommends policies that improve household purchasing power, enhance access to affordable antioxidant-rich foods, and strengthen nutrition education programmes to encourage healthy dietary practices and reduce the burden of chronic diseases.

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**Theme/Sub-Theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title: Fatty Acid Composition of and Sensory Evaluation of Fried Animal Products with *Terminalia catappa* Seed Oil**

**Name of Authors: *Boniwey, T. S.[1,2] Elemo, B. O.[1] Adepoju, O. T.[2] Adu, O. B.[1] Kanmodi, R. I.[1] Iyoriobhe, A. O.[1] Olalekan, M. O.[1] and Bakare, K.**

**Affiliation of Authors:** [1]Department of Biochemistry, Faculty of Science, Lagos State University, Lagos, Nigeria

[2]Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria.

***Corresponding author:** sophiaboniwey@gmail.com, +2348147572357

**Keywords:** *Terminalia catappa*; Seed oil processing; Fatty acid composition; Organoleptic evaluation

**Highlights**

- Roasted *Terminalia catappa* seed oil contains 96.9% total unsaturated fatty acids.
- Roasting elevated oleic acid content from 31.6% in dried oil to 62.5% in roasted oil.
- Animal products fried in *T. catappa* oils had sensory acceptance equal to commercial oil.

**BACKGROUND AND OBJECTIVES:** Edible oil supply in Nigeria relies heavily on standard commercial vegetable oils, leaving consumers exposed to price volatility and limited dietary diversity. Underutilised indigenous seeds, such as tropical almond (*Terminalia catappa*), offer an abundant locally available alternative to diversify lipid sources. However, evidence remains sparse regarding how processing methods (drying vs. roasting) alter its fatty acid profile and whether the extracted oils yield acceptable organoleptic quality when frying animal products. This study evaluated the fatty acid composition of dried and roasted *T. catappa* seed oils and determined the sensory acceptability of turkey, meat, and fish fried in these oils relative to commercial sunflower oil.

**MATERIALS AND METHODS:** Mature *Terminalia catappa* fruits were collected within and outside the surroundings of Lagos State University Campus, Lagos, Nigeria. Kernels were manually extracted, dried, milled, and subjected to oil extraction using n-hexane in a Soxhlet apparatus, followed by purification and bleaching. Fatty acid methyl ester (FAME) composition was analysed using Gas Chromatography. To evaluate culinary utility, turkey, meat, and fish were fried using dried *T. catappa* oil, roasted *T. catappa* oil, and commercial sunflower oil (control). Organoleptic attributes (crispiness, colour, aroma, taste, overall acceptability) were evaluated by a sensory panel. Mean scores and standard deviations were computed. Data were analysed using descriptive statistics and analysis of variance (ANOVA) at a significance level of $p < 0.05$.

**RESULTS AND DISCUSSION:** Both dried and roasted oils are rich in unsaturated fatty acids [1]. Dried *T. catappa* seed oil contained margaric acid (57.2%) as the major saturated fatty acid, along with oleic (31.6%), palmitoleic (6.4%), and eicosanoic (3.1%) acids. Thermal roasting altered the fatty acid profile, eliminating saturated margaric acid and producing a highly unsaturated oil (96.9% total unsaturated fatty acids) dominated by oleic acid (62.5%), linoelaidic acid (19.5%), palmitoleic acid (14.9%), and linoleic acid (2.9%). Oleic and palmitoleic acids were common to both oil preparations. Monounsaturated fatty

acids such as oleic acid contribute positively to plasma lipid profiles. Sensory evaluation (Table 1) revealed that turkey, meat, and fish fried in dried or roasted *T. catappa* seed oils exhibited sensory ratings comparable to those fried in commercial sunflower oil across all evaluated parameters. Meat fried in dried oil scored highest numerically, confirming the culinary viability of *T. catappa* oil as a local frying medium.

**Table 1: Organoleptic Acceptance of Animal Products Fried with *T. catappa* and Commercial Oil**

| Product | Oil Treatment | Crispiness | Color | Aroma | Taste | Acceptability |
|---|---|---|---|---|---|---|
| Turkey | Control Oil | 4.65 ± 0.81 | 5.10 ± 0.45 | 4.80 ± 0.77 | 4.95 ± 0.61 | 5.05 ± 0.69 |
| | Roasted Oil | 4.65 ± 0.81 | 4.80 ± 0.83 | 4.80 ± 0.70 | 5.25 ± 0.44 | 5.10 ± 0.64 |
| | Dried Oil | 4.65 ± 0.49 | 4.95 ± 0.69 | 5.05 ± 0.69 | 4.84 ± 0.69 | 5.10 ± 0.64 |
| Meat | Control Oil | 4.30 ± 0.66 | 4.85 ± 0.37 | 4.45 ± 0.61 | 4.90 ± 0.72 | 4.60 ± 0.68 |
| | Roasted Oil | 4.53 ± 0.61 | 4.89 ± 0.66 | 4.84 ± 0.83 | 4.89 ± 0.68 | 5.00 ± 0.67 |
| | Dried Oil | 5.30 ± 0.66 | 5.25 ± 0.44 | 5.00 ± 0.65 | 5.15 ± 0.81 | 5.00 ± 0.46 |
| Fish | Control Oil | 4.55 ± 0.83 | 4.80 ± 0.70 | 4.70 ± 0.80 | 4.95 ± 0.69 | 5.00 ± 0.73 |
| | Roasted Oil | 4.29 ± 1.10 | 4.76 ± 0.83 | 4.71 ± 0.56 | 4.81 ± 0.75 | 4.90 ± 0.63 |
| | Dried Oil | 4.70 ± 0.93 | 4.70 ± 0.66 | 4.80 ± 0.77 | 4.75 ± 0.72 | 4.85 ± 0.67 |

*Values presented as Mean ± SD of three determinations. One-way ANOVA showed no statistically significant differences across oil treatments for any product ($p > 0.05$).*

**CONCLUSION AND RECOMMENDATION(S):** Dried and roasted *Terminalia catappa* seed oils are rich in health-promoting unsaturated fatty acids, with roasting substantially increasing monounsaturated oleic acid. Both oils demonstrate excellent functional utility in frying turkey, meat, and fish, achieving organoleptic acceptance equal to commercial sunflower oil. Promoting local extraction and utilization of *T. catappa* seed oil represents a practical strategy to enhance lipid nutrition and support food system transformation in Nigeria.

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**Sub-theme:** Transforming local food system for improved food security and nutrition

**Title:** Effect of processing on the levels of micro minerals of four commonly consumed legumes in Nigeria

**Name of Authors:** [*1, 2]Anifowose, F., [1]Shokunbi, O.S., and [1]Kayode, A.A.A.

**Affiliation of Authors:** [1] Department of Biochemistry, Babcock University, Ilishan, Ogun State

[2] Department of Medical Biochemistry, College of Medicine, Lagos State University, Ikeja, Lagos

[*]**Corresponding Author's Details:** florence.anifowose@lasucom.edu.ng, 08035660850

**Highlights:**

- Local processing methods greatly lowers Cu, Fe, Mn, and Zn in locust beans soybean.
- Local processing methods minimally affects micro minerals in cowpea and groundnut.

**Keywords:** Dietary diversification, Legume processing Micronutrient deficiency, Micro minerals,

**BACKGROUND AND OBJECTIVE:** Low intakes and limited dietary diversification are the primary cause of hidden hunger (micronutrient deficiencies) among populations [1]. Legumes are a highly nutritious, abundant, and sustainable source of essential minerals, but are often overlooked by consumers, perhaps due to limited information about their huge potentials. Food processing tends to modulate the nutrient composition of the food products. However, limited data exist on the extent to which common household processing impact the levels of micro minerals in legumes Thus, this research determined the effect of processing on the micro mineral levels of commonly consumed legumes in Nigeria.

**MATERIALS AND METHODS:** Cowpea, groundnut, soybean and fermented African locust beans were purchased from the markets across six geopolitical zones in Nigeria. Some batches were purposively selected and processed to various locally consumed forms. They were dried and wet digested using AOAC official method (2015.01) before micro mineral determination, using inductively coupled plasma-optical emission spectrophotometer (ICP-OES).

**RESULTS AND DISCUSSION**: Table 1 shows the effect of various processing methods on the levels of micro minerals in the legumes. Processing had minimal effect on the micro mineral contents of the cowpea and groundnut, which is consistent with Tamerat and Getachew [2]. However, they significantly reduced ($p < 0.05$) the levels of Cu, Fe, Mn, and Zn, in the locust bean and soybean probably due to multiple processing to obtain products, especially for soybean.

**CONCLUSION AND RECOMMENDATION:** In conclusion, local processing methods modulated the levels of micro minerals in the commonly consumed legumes with limited effect on the cowpea and groundnut. Thus, it is recommended that legumes should be regularly consumed to improve micro mineral intakes.

**Table 1: Effect of Processing on the levels of micro minerals (mg/kg dry weight) in commonly consumed legumes in Nigeria**

| Processing status | Cr | Cu | Fe | Mn | Mo | Se | Zn |
|---|---|---|---|---|---|---|---|
| **Cowpea raw** | ND | 5.38±0.022$^{c}$ | 110±0.671$^{a}$ | 25.6±0.671$^{b}$ | 6.27±0.671$^{b}$ | 0.516±0.708$^{a}$ | 39.8±0.483$^{c}$ |
| **Plain boiled Cowpea** | ND | 4.37±0.358$^{b}$ | 98.6±0.223$^{a}$ | 24.8±0.081$^{b}$ | 3.50±1.41$^{a}$ | ND | 36.4±0.464$^{b}$ |
| **Pottage beans** | ND | 3.02±0.081$^{a}$ | 133±0.170$^{ab}$ | 18.7±0.426$^{a}$ | 3.44±0.667$^{a}$ | ND | 26.2±1.02$^{a}$ |
| ***Moi-moi*** | ND | 4.72±0.059$^{b}$ | 88.9±1.06$^{a}$ | 21.7±0.322$^{b}$ | 5.96±0.739$^{b}$ | ND | 37.7±0.675$^{b}$ |
| **Groundnut raw** | ND | 6.67±0.232$^{c}$ | 60.6±1.72$^{ab}$ | 23.9±0.173$^{b}$ | 1.90±0.178$^{a}$ | ND | 34.9±0.152$^{a}$ |
| **Boiled groundnut** | ND | 5.00±0.192$^{b}$ | 160±3.57$^{d}$ | 24.8±0.116$^{b}$ | 1.94±0.178a | ND | 39.6±0.543$^{b}$ |
| **Roasted groundnut** | ND | 3.89±0.158$^{a}$ | 42.0±0.535$^{a}$ | 20.8±0.294$^{a}$ | 2.20±0.137$^{a}$ | ND | 33.5±0.436$^{a}$ |
| **Peanut butter** | ND | 6.03±0.053$^{c}$ | 92.5±0.392$^{bc}$ | 29.8±0.0721$^{c}$ | 2.25±0.098$^{a}$ | ND | 57.2±0.550$^{c}$ |
| **Fermented African LB** | 0.945±0.049$^{a}$ | 12.7±0.298$^{b}$ | 724±6.249$^{b}$ | 71.1±0.281$^{b}$ | 0.778±0.089$^{b}$ | 0.407±0.387$^{a}$ | 60.7±0.901$^{b}$ |
| **Tomatoes sauce with LB** | ND | 5.62±0.246$^{a}$ | 216±4.18$^{a}$ | 36.7±1.680$^{a}$ | 0.573±0.045$^{a}$ | 0.112±0.045$^{a}$ | 30.2±0.457$^{a}$ |
| **Vegetable soup with LB** | 1.72±0.021$^{a}$ | 5.96±0.086$^{a}$ | 1730±56.4$^{c}$ | 39.3±1.02$^{a}$ | 1.17±0.0424$^{b}$ | 0.764±0.451$^{b}$ | 30.1±0.444$^{a}$ |
| **Soy bean raw** | ND | 7.64±0.15$^{c}$ | 186±4.54$^{c}$ | 54.2± 0.630$^{c}$ | 2.56±0.427$^{b}$ | ND | 51.4±1.82$^{d}$ |
| **Soy bean milk** | ND | 7.84±0.091$^{c}$ | 130±2.23$^{b}$ | 54.0±1.57c | 2.80±0.849$^{b}$ | ND | 44.5±0.877$^{c}$ |
| **Tofu (fresh)** | ND | 3.61±0.264$^{a}$ | 59.0±0.701$^{a}$ | 20.6±0.630$^{a}$ | 1.13±0.117$^{a}$ | ND | 27.2±0.382$^{a}$ |
| **Tofu (fried)** | ND | 6.26±0.095$^{b}$ | 83.6±0.721$^{b}$ | 29.5±0.458$^{b}$ | 1.17±0.055$^{a}$ | ND | 36.2±1.00$^{b}$ |

Values are represented as mean ± standard deviation (n = 3). Values with different superscripts in the same column within each legume are significantly different at $p < 0.05$. ND - Not detected, LB- Locust bean

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**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Physicochemical Properties and Sensory Evaluation of Some Doum Palm (*Hyphaene thebaica*) Fruit Functional Beverages

**Names of Authors: ***Rahman, B. E., Etuh, G. E., Shokunbi, O. S.

**Affiliation of Authors:** Department of Biochemistry, Babcock University, Ilisan Remo, Ogun State

***Corresponding Author's Details:** bazeetonline@gmail.com, +2348132052246

**Keywords:** Doum palm fruit beverage, *Hyphaene thebaica*, Physicochemical properties, Sensory evaluation

**Highlights: -** Doum palm fruit-based concentrate is preferable to doum drink.

- Consumers accept moderate fortification of doum palm fruit-based yoghurt

**Background and Objective**: Doum palm (*Hyphaene thebaica*) fruit remains underutilised in the development of functional foods, despite its potential to improve local food systems, dietary diversity, nutrition security, and health [1]. Furthermore, its development into functional beverages lack supporting evidence, especially on the acceptability of the products. Thus, this study was designed to determine physicochemical and sensory properties of some formulated doum palm fruit beverages.

**Materials and Methods:** The yoghurts were produced with powdered skimmed milk, starter culture, water and doum palm fruit powder at two fortification levels [2]. The doum drinks were produced by soaking doum palm fruit for eight hours, and obtaining its filtrate [3], while the levels of the concentrates were achieved by freeze-drying the drinks at varied timing. Physicochemical properties were determined using standard analytical procedures. The sensory profile was evaluated with a 25 semi-trained panel, using a nine-point hedonic scale assessing appearance, colour, aroma, taste, texture and overall acceptability. Data were analyzed using one-way analysis of variance, and means were compared using Tukey post hoc's test at $p < 0.05$.

**Results and Discussion:** Similar to the reports from other studies [2, 4], Doum-fortified yoghurt maintained stable pH (5.28–5.29) and titratable acidity (1.12–1.16% lactic acid equivalent), while fortification significantly increased viscosity (from 6.09 cP in the plain yoghurt to 14.50 cP in 3% fortified yoghurt) and total soluble solids. The 1.5% fortified yoghurt achieved better overall acceptability comparable to the plain yoghurt, whereas 3% fortification reduced sensory preference (Table 1), and this decline agrees with the findings of Khider et al. [2]. The doum concentrate exhibited the highest viscosity (70.60 cP) with the total solid of 55 °Brix. It also received favourable sensory ratings, highlighting the potential of moderate fortification to optimise product quality and consumer acceptability.

**Table 1:** Sensory properties of some Doum palm fruit-based functional beverages

| Sample | Appearance | Aroma | Colour | Taste | Texture | General Acceptability |
|---|---|---|---|---|---|---|
| **PYOG** | $8.04 \pm 1.02^{a}$ | $7.84 \pm 1.18^{a}$ | $7.88 \pm 1.39^{a}$ | $5.84 \pm 1.89^{a, b}$ | $6.84 \pm 1.77^{a, b}$ | $6.88 \pm 1.13^{a}$ |
| **YOG1** | $6.96 \pm 1.54^{a, b}$ | $7.16 \pm 1.14^{a, b}$ | $6.44 \pm 1.50^{b}$ | $6.04 \pm 1.37^{a, b}$ | $5.96 \pm 1.49^{a, c}$ | $6.32 \pm 1.25^{a, b}$ |
| **Y0G2** | $6.04 \pm 1.81^{b}$ | $6.4 \pm 1.61^{b}$ | $6.08 \pm 1.89^{b}$ | $4.8 \pm 1.80^{b}$ | $5.08 \pm 1.91^{c}$ | $5.6 \pm 1.55^{b}$ |
| **DCON1** | $7.08 \pm 1.41^{a, b}$ | $7.24 \pm 1.23^{a, b}$ | $7.12 \pm 1.24^{a, b}$ | $7.12 \pm 1.45^{a}$ | $7.2 \pm 1.22^{a}$ | $6.92 \pm 1.26^{a}$ |
| **DCON2** | $5.56 \pm 2.33^{b}$ | $6.4 \pm 1.85^{b}$ | $5.72 \pm 1.95^{b}$ | $5.64 \pm 1.96^{a, b}$ | $6.32 \pm 1.82^{a, c}$ | $6.4 \pm 1.47^{a, b}$ |
| **DDRK1** | $5.92 \pm 2.10^{b}$ | $6.12 \pm 1.64^{b}$ | $6 \pm 1.87^{b}$ | $5.84 \pm 2.06^{a, b}$ | $5.84 \pm 1.95^{a, c}$ | $5.96 \pm 1.77^{a, b}$ |
| **DDRK2** | $5.88 \pm 2.15^{b}$ | $6 \pm 1.80^{b}$ | $5.88 \pm 1.86^{b}$ | $5.52 \pm 1.94^{b}$ | $5.6 \pm 1.96^{b, c}$ | $5.96 \pm 1.74^{a, b}$ |

Values are represented as mean ± standard deviation (n = 25). Plain Yoghurt is represented as PYOG. YOG1 and YOG2 are represented as yoghurt with 1.5% and 3% doum palm fruit fortification respectively. DCON1 and DDRK1 as doum concentration and doum drink of higher strength respectively; while DCON2 and DDRK2 as doum concentration and doum drink of lower strength, respectively. Values with different superscript alphabets across individual columns are significantly different at $p < 0.05$.

**Conclusion and Recommendations:** Doum palm fruit-based functional beverages, particularly 1.5% fortified yoghurt, demonstrated acceptable sensory qualities and consumer preference, supporting its promotion as nutritious and palatable product for enhancing dietary diversity within local food systems. The doum drink should be optimized in future studies to enhance acceptability.

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SUB THEME:Transforming Local Food Systems for Improved Food Security and Nutrition

TITLE: NUTRITION AND SENSORY EVALUATION OF STIFF DOUGH (SWALLOW) MADE FROM BLENDS OF WHEAT, COCOYAM AND ACHA FLOUR

NAME OF AUTHOR: Odeniyi T., D. and Olufadeju J.,O.

AFFILIATION OF AUTHOR: Department of Nutrition and Dietetics

The Federal polytechnic Ilaro

damilolaodeniyi1@gmail.com

HIGHLIGHTS OF THE STUDY

1. The research developed stiff dough (swallow) from blends of cocoyam and acha flours as an alternative to conventional swallow products.
2. Results revealed that that cocoyam to acha stiff dough has the potential to serve as a nutritious and acceptable swallow made from indigenous crops.

BACKGROUND OF THE STUDY

Stiff dough, commonly known as swallow, is a staple food widely consumed in Nigeria and other parts of West Africa, typically served with soups or vegetable-based dishes. Growing concerns over food security, dietary diversification, and the utilization of indigenous crops have driven the development of alternative swallow products from underutilized food resources (1). Therefore, this study evaluated the nutritional and physical properties of stiff dough produced from blends of cocoyam and acha flour.

MATERIALS AND METHOD

Raw ingredients were sourced from local markets and processed into flour using standard methods. Five samples (A–E) were formulated at ratios of 100:0:0, 75:15:10, 65:20:15, 55:25:20, and 0:50:50, respectively. The stiff dough samples were analyzed for proximate composition, micronutrients, and physical properties using standard methods (2). Data were analyzed using SPSS version 27, and mean differences were determined with Duncan's multiple range test.

RESULT AND DISCUSSION

Results showed moisture content was from 8.12 to 9.43%, with sample A having the highest value. Sample E had the highest Ash content (2.14%), protein content (11.74%), fat (4.19%), and fiber (2.22%). The protein content reported in this study was lower when compare to the study of (3) who reported 2.50% to 12.6%, which was however higher when compared to (4) who reported 1.31% to 5.7%.

Table 1: Proximate composition of formulated stiff dough

| Samples | Moisture (%) | Ash (%) | Protein (%) | Fat (%) | Fiber (%) | CHO (%) |
|---|---|---|---|---|---|---|
| A | 9.43±0.021$^{e}$ | 1.40±0.021$^{e}$ | 8.11±0.014$^{e}$ | 2.69±0.021$^{e}$ | 1.26±0.021$^{e}$ | 77.09±0.028$^{e}$ |
| B | 9.10±0.021$^{d}$ | 1.62±0.021$^{d}$ | 9.86±0.014$^{d}$ | 3.11±0.014$^{d}$ | 1.63±0.021$^{d}$ | 74.66±0.014$^{d}$ |
| C | 8.76±0.028$^{c}$ | 1.79±0.021$^{c}$ | 10.65±0.014$^{c}$ | 3.46±0.014$^{c}$ | 1.79±0.014$^{c}$ | 73.54±0.035$^{c}$ |
| D | 8.61±0.028$^{b}$ | 2.01±0.014$^{b}$ | 11.16±0.021$^{b}$ | 3.90±0.014$^{b}$ | 2.03±0.021$^{b}$ | 71.28±0.028$^{b}$ |
| E | 8.12±0.028$^{a}$ | 2.14±0.021$^{a}$ | 11.74±0.021$^{a}$ | 4.19±0.021$^{a}$ | 2.22±0.021$^{a}$ | 69.57±0.028$^{a}$ |

Values reported are mean + standard deviation of duplicate determinations.Mean with different super script within the columns are significantly different <p<0.05>.

Keywords:WheatFlour (WF),Cocoyam Flour(CF),Acha Flour(AF).

Sample A = 100% (control)

SampleB=75%+15%+10%.

SampleC =65%+20%+15%.

SampleD=55%+25%+ 20%.

SampleE=0%+50% +50%.;

The vitamin composition of the formulate stiff dough was from 0.23 to 0.50mg, 0.09 to 0.20mg and 0.55 to 1.03mg for vitamin B1, B2 and E respectively. Mineral analysis revealed that the iron content was 3.79 to 6.59mg, Phosphorus 107.76 to 152.72mg and magnesium was 82.83 to 119.21mg.

Table 2: Micro-nutrient Composition of the Formulated Samples

| Sample | Vitamin B1(mg/100g) | Vitamin B2(mg/100g) | Vitamin E (mg/100g) | Iron (mg/100g) | Phosphorous (mg/100g) | Magnesium (mg/100g) |
|---|---|---|---|---|---|---|
| A | 0.29±0.014$^{e}$ | 0.09±0.00$^{e}$ | 0.55±0.021$^{e}$ | 3.79±0.028$^{e}$ | 107.76±0.92$^{e}$ | 82.83±0.89$^{e}$ |
| B | 0.23±0.00$^{d}$ | 0.11±0.00$^{d}$ | 0.74±0.021$^{d}$ | 4.40±0.021$^{d}$ | 125.27±0.48$^{d}$ | 98.82±0.30$^{d}$ |
| C | 0.40±0.014$^{c}$ | 0.13±0.00$^{c}$ | 0.90±0.014$^{c}$ | 5.21±0.042$^{c}$ | 138.92±0.28$^{c}$ | 108.06±0.32$^{c}$ |
| D | 0.45±0.014$^{c}$ | 0.17±0.00$^{c}$ | 0.95±0.021$^{b}$ | 5.89±0.021$^{b}$ | 145.08±0.25$^{b}$ | 112.26±0.39$^{b}$ |
| E | 0.50±0.014$^{b}$ | 0.20±0.014$^{b}$ | 1.03±0.021$^{a}$ | 6.59±0.035$^{a}$ | 151.72±0.97$^{a}$ | 119.21±0.34$^{a}$ |

Values reported are mean+ standard deviation of duplicate determinations. Mean with different super script within the columns are significantly different <p<0.05>.

Keywords:WheatFlour (WF),Cocoyam Flour(CF),Acha Flour(AF).

Sample A = 100% (control) SampleB=75%+15%+10%.

SampleC =65%+20%+15%.

SampleD=55%+25%+ 20%.

SampleE=0%+50% +50%.

## CONCLUSION AND RECOMMENDATION

The study concluded that stiff dough produced from cocoyam and acha flour blends has the potential to serve as a nutritious and acceptable alternative to conventional swallow foods. Further studies are recommended to determine the optimal cocoyam-to-acha flour ratio that best balances nutritional quality, functional properties, and consumer acceptability.

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**Sub-Theme:** Transforming Local Food Systems for Improved Food Security and Nutrition
**Title:** Development, Nutritional and Quality Evaluation of Tomato Fruit-Fortified Complementary Food Formulated from Composite Blends of Sorghum, Soybean, and Sweet Potato
**Name of Author (s): ***Adeosun F. F.[1] and Akintola, A. O.
**Affiliation of Author (s):** [1]Department of Nutrition and Dietetics, Federal University of Technology Ilaro, Ogun State, Nigeria.
***Corresponding author email: praisesamj@gmail.com; +2348036346842.**
**Keywords: complementary foods, beta-carotene, sensory evaluation, microbial analysis**

**Highlights:**

- Ripe tomato fruit, red sorghum and sweet potato are rich sources of beta-carotene
- As tomato fruit inclusion increased, there was notable rise in carotenoid and beta-carotene contents of the complementary porridge indicating vitamin A rich formulations with benefits for infant growth and development.

**BACKGROUND AND OBJECTIVES:** Complementary foods are liquids, semi-solid and solid foods which are introduced alongside breast milk or infant formula, for children's physical growth, cognitive development, and immune function [1]. The introduction of complementary food after six months of exclusive breastfeeding is often associated with low levels of dietary diversity, poor consumption of vitamin A rich food [2], while the vitamin A needs of infants become significantly higher at this stage to sustain the rapid growth. Authors have acknowledged that local, bio-enriched, and food-based solutions to micronutrient malnutrition could provide more sustainable, more culturally acceptable, and affordable solutions [3]. This study therefore determined proximate composition, vitamins, minerals, phytochemical, sensory and microbial quality of tomato fruit-fortified complementary food formulated from composite blends of sorghum, soybean and sweet potato.

**MATERIALS AND METHODS:** Tomato fruits, sorghum, soybean and sweet potato were processed into flours, blended and formulated into five samples of complementary food. Formulations **were processed into porridge by adding 100 g of sample to 50 mL water to form paste, which was added to 200 mL of boiling water, stirred continuously over low heat to obtain porridge. P**roximate, thiamine, folate, beta-carotene, iron, iodine, zinc, carotenoid, flavonoid, phenol, tannin, sensory and microbial quality of complementary foods were determined using standard procedures.

**RESULTS AND DISCUSSION:** Table 1 shows proximate, micronutrients and phytochemical contents while Table 2 indicates sensory analysis and microbial quality of complementary foods. Protein content of porridge reported in this study is similar to values reported across commercial complementary foods [4] found a broad range of 0.92–18.16%. Increasing proportion of tomato fruit in porridge samples significantly enhanced total carotenoid and β-carotene concentrations. The high proportion of β-carotene observed in porridge is beneficial as β-carotene exhibits highest

provitamin A activity among dietary carotenoids [2], thereby contributing substantially to vitamin A intake.

**Table 1: Proximate, micronutrients and phytochemical contents of complementary food**

| Samples | Protein (%) | Ash (%) | BetaCarotene (µg/g) | Iron (mg/100g) | Carotenoid (µg/g) | Flavonoid (mg/100g) |
|---|---|---|---|---|---|---|
| **A** | $8.85^{d} \pm 2.72$ | $2.06^{e} \pm 0.30$ | $85.30^{e} \pm 1.13$ | $1.65^{d} \pm 0.02$ | $4.76^{e}x10^{3} \pm 0.07$ | $1.41^{e} \pm 0.03$ |
| **B** | $8.77^{d} \pm 2.53$ | $2.15^{d} \pm 0.38$ | $211.58^{d} \pm 1.03$ | $2.48^{c} \pm 0.03$ | $5.27^{d}x10^{3} \pm 0.08$ | $2.12^{d} \pm 0.04$ |
| **C** | $10.03^{c} \pm 0.83$ | $2.25^{c} \pm 0.30$ | $260.33^{c} \pm 0.60$ | $2.83^{b} \pm 0.02$ | $5.85^{c}x10^{3} \pm 0.08$ | $2.60^{c} \pm 0.04$ |
| **D** | $10.94^{b} \pm 2.05$ | $2.37^{b} \pm 0.41$ | $304.63^{b} \pm 1.10$ | $3.10^{a} \pm 0.01$ | $6.45^{b}x10^{3} \pm 0.06$ | $3.11^{b} \pm 0.03$ |
| **E** | $11.60^{a} \pm 1.22$ | $2.46^{a} \pm 0.33$ | $360.23^{a} \pm 1.87$ | $3.25^{a} \pm 0.02$ | $7.25^{a}x10^{3} \pm 0.09$ | $3.47^{a} \pm 0.04$ |

Mean values with different superscripts in each column are significantly different at $p \leq 0.05$,± Standard deviation. Sample A (sorghum 100% control), Sample B (Sorghum 65%, Sweet Potatoes 5%, soybean 20%, tomatoes 10%), Sample C (Sorghum 60%, Sweet Potatoes 5%, soybean 20%, tomatoes 15%), Sample D (Sorghum 55%, Sweet Potatoes 5%, soybean 20%, tomatoes 20%), Sample E (Sorghum 50%, Sweet Potatoes 5%, soybean 20%, tomatoes 25%)

**Table 2: Sensory analysis and microbial quality of complementary food**

| Samples | Taste | Flavour | Appearance | Overall Acceptability | Total Plate Count(Cfu/g $x10^{2}$) | Environmental ColiformCount (Cfu/g $x10^{1}$) |
|---|---|---|---|---|---|---|
| **A** | $7.84^{a} \pm 0.85$ | $7.96^{a} \pm 0.93$ | $7.80^{a} \pm 1.08$ | $8.56^{a} \pm 0.65$ | $2.05^{e} \pm 0.07$ | $2.15^{e} \pm 0.07$ |
| **B** | $7.32^{b} \pm 0.95$ | $7.00^{e} \pm 0.87$ | $7.28^{b} \pm 0.98$ | $7.56^{b} \pm 0.92$ | $2.35^{d} \pm 0.07$ | $2.35^{d} \pm 0.07$ |
| **C** | $7.16^{c} \pm 1.07$ | $7.12^{c} \pm 0.93$ | $6.84^{d} \pm 0.85$ | $7.36^{c} \pm 0.91$ | $2.40^{c} \pm 0.28$ | $2.55^{c} \pm 0.07$ |
| **D** | $7.04^{d} \pm 0.84$ | $7.24^{b} \pm 1.16$ | $7.16^{c} \pm 0.94$ | $7.24^{d} \pm 1.09$ | $2.75^{b} \pm 0.07$ | $2.75^{b} \pm 0.07$ |
| **E** | $6.72^{e} \pm 0.84$ | $7.16^{d} \pm 1.03$ | $7.00^{c} \pm 1.22$ | $7.08^{e} \pm 1.04$ | $2.95^{a} \pm 0.07$ | $2.95^{a} \pm 0.07$ |

Mean values with different superscripts in each column are significantly different at $p \leq 0.05$,± Standard deviation. Sample A (sorghum 100% control), Sample B (Sorghum 65%, Sweet Potatoes 5%, soybean 20%, tomatoes 10%), Sample C (Sorghum 60%, Sweet Potatoes 5%, soybean 20%, tomatoes 15%), Sample D (Sorghum 55%, Sweet Potatoes 5%, soybean 20%, tomatoes 20%), Sample E (Sorghum 50%, Sweet Potatoes 5%, soybean 20%, tomatoes 25%)

**CONCLUSION AND RECOMMENDATİON(S):** This study showed that blends of tomato fruit, sorghum, soybean and sweet potato improved the carotenoid, β-carotene, protein, ash and iron contents including acceptable sensory attributes and microbial quality of complementary food. Bioavailability studies and community-based feeding trials are recommended.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Valorization of Banana (Musa balbisiana), Soybean (Glycine max) Flours and Moringa (Moringa oleifera) Leaves for Complementary Food Development: Nutritional Composition and Sensory Acceptability

**Name of Author(s):** *Adeoye-Agomoh, Q.C.[1], Chukwuemeka, M.C.[1], Nicholas, C.F.[1], Ezenwa, H.C.[1], Ezealla, C.M.[1], Chinyere, F.C.[1].

**Affiliation of Author(s):** 1 Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria. *Corresponding author, e-mail: adeoye-agomoh.queen@mouau.edu.ng, +2348035775545

**Keywords:** Complementary food; Banana peel; Soybean flour; Moringa leaves

## HIGHLIGHTS

• AP4 had the highest protein (20.74%) and fat (23.36%) contents.

• AP1 had the highest taste, aroma and overall acceptability scores.

• Soybean and moringa fortification improved nutritional quality.

## BACKGROUND AND OBJECTIVES

Complementary feeding from 6 to 24 months is a critical period when breast milk alone may not meet all nutrient requirements. Cereal-based complementary foods can be bulky and low in protein and micronutrients [1, 2]. Banana, soybean and moringa are locally available sources of energy, protein and micronutrients. This study evaluated the nutritional composition and sensory acceptability of complementary foods formulated from these ingredients.

## MATERIALS AND METHOD

Fresh iron-seed bananas (Musa balbisiana), soybeans (Glycine max) and Moringa oleifera leaves were purchased from Ndoro Market, Abia State. Unpeeled bananas were sliced, blanched at 80°C for 5 min, oven-dried at 60°C for 24 h and milled. Soybeans were dehulled, dried at 60°C and milled; moringa leaves were washed in 1% saline, rinsed, dried at 60°C and pulverized. Formulations were banana: soybean: moringa at 70:20:10 (AP1), 60:30:10 (AP2), 55:35:10 (AP3) and 50:40:10 (AP4); AP5 (Nutribom) was the commercial control. Proximate composition, vitamins and minerals were determined using standard AOAC methods. Sensory evaluation involved 20 semi-trained nursing mothers using a 9-point hedonic scale. Data were analysed by one-way ANOVA and Duncan's Multiple Range Test ($p<0.05$).

## RESULTS AND DISCUSSION

Significant differences ($p<0.05$) occurred among samples (Table 1). AP4 had the highest protein (20.74%), fat (23.36%) and fibre (2.77%), while AP2 had the highest energy (459.50 kcal/100 g). Moisture contents were below 10%. Increasing soybean inclusion generally increased protein, fat and fibre [4]. AP1 had the highest β-carotene, vitamin C, vitamin D, magnesium, iron and zinc among local blends, whereas AP4 had the highest vitamins B9, E and K.

AP1 had the highest taste (6.39), aroma (6.03) and general acceptability (5.97) scores (Table 2), likely reflecting its higher banana proportion. Increasing soybean substitution in AP2–AP4 was associated with slightly lower scores, possibly due to beany flavour. Texture did not differ significantly ($p>0.05$).

**Table 1: Proximate Composition of Formulated Complementary Foods (Dry Matter/100 g)**

| Sample | Moisture (%) | Protein (%) | Fat (%) | Fibre (%) | Ash (%) | Carbohydrate (%) | Energy (kcal) |
|---|---|---|---|---|---|---|---|
| AP1 | $8.57^{a}$±0.05 | $18.92^{c}$±0.03 | $6.75^{e}$±0.02 | $0.95^{d}$±0.04 | $6.64^{e}$±0.04 | $56.36^{b}$±0.04 | $361.83^{e}$±0.09 |
| AP2 | $7.96^{b}$±0.06 | $17.85^{d}$±0.00 | $13.36^{c}$±0.04 | $1.44^{c}$±0.04 | $5.42^{b}$±0.04 | $44.51^{e}$±0.05 | $459.50^{a}$±0.05 |
| AP3 | $6.96^{c}$±0.06 | $19.77^{b}$±0.03 | $16.69^{b}$±0.02 | $1.86^{b}$±0.04 | $5.27^{c}$±0.05 | $48.50^{d}$±0.06 | $427.11^{b}$±0.08 |
| AP4 | 6.03d±0.04 | $20.74^{a}$±0.02 | $23.36^{a}$±0.03 | $2.77^{a}$±0.04 | $4.47^{d}$±0.03 | $54.94^{c}$±0.04 | $419.04^{d}$±0.03 |
| AP5 | $3.24^{e}$±0.06 | $15.40^{e}$±0.04 | $10.01^{d}$±0.08 | $0.51^{e}$±0.04 | $3.53^{e}$±0.06 | $67.32^{a}$±0.12 | $420.95^{c}$±0.11 |

**Table 2: Sensory Attributes of Formulated Complementary Foods (9-Point Hedonic Scale)**

| Sample | Colour | Taste | Aroma | Texture | General Acceptability |
|---|---|---|---|---|---|
| AP1 | $5.50^{a}$ ± 3.13 | $6.39^{a}$ ± 1.20 | $6.03^{a}$ ± 1.08 | $5.94^{a}$ ± 1.43 | $5.97^{a}$ ± 1.07 |
| AP2 | $5.72^{a}$ ± 1.32 | $5.72^{b}$ ± 0.94 | $5.61^{ab}$ ± 1.02 | $5.72^{a}$ ± 1.21 | $5.69^{ab}$ ± 0.57 |
| AP3 | $5.78^{a}$ ± 0.87 | $5.75^{b}$ ± 0.94 | $5.44^{b}$ ± 1.11 | $5.75^{a}$ ± 1.20 | $5.68^{ab}$ ± 0.54 |
| AP4 | $5.33^{a}$ ± 1.04 | $5.78^{b}$ ± 0.99 | $5.72^{ab}$ ± 1.03 | $5.56^{a}$ ± 1.11 | $5.60^{b}$ ± 0.56 |
| AP5 | $5.72^{a}$ ± 1.16 | $5.31^{b}$ ± 1.09 | $5.33^{b}$ ± 1.07 | $5.36^{a}$ ± 0.99 | $5.43^{b}$ ± 0.65 |

## CONCLUSION AND RECOMMENDATION(S)

Banana flour fortified with soybean and moringa produced nutrient-dense, acceptable complementary foods. AP4 had the best protein and fat profiles, while AP1 had the highest sensory acceptability. Local producers can explore these ingredients; further work should assess shelf-life and mineral bioavailability.

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**Theme:** DELIVERING BETTER NUTRITION FOR ALL: CONNECTING THE DOTS ACROSS LIFE CYCLE, SYSTEM AND SECTORS

**Sub-theme:** TRANSFORMING LOCAL FOOD SYSTEMS FOR IMPROVED FOOD SECURITY AND NUTRITION

**TITLE:** Dietary Phytochemicals Protect Thyroid Peroxidase Against Cassava-Derived Hydrocyanic Acid and Thiocyanate: Evidence from Kinetics and Molecular Docking

Madukosiri, C.H.[1]*, Madukosiri, G.J.[2] and Edeh, M.I.[3]

[1]Department of Biochemistry, Basic Medical Sciences, College of Health Sciences, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.

[2]Department of Medicine and Surgery, College of Health Sciences, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.

[3]Department of Medical Laboratory Science, Basic Medical Sciences, College of Health Sciences, Niger Delta University, Wilberforce Island, Bayelsa State, Nigeria.

*Corresponding Author's e-mail: chikasiri@gmail.com; Phone: 07036154861

**Keywords:** Cassava; Thyroid peroxidase; Dietary phytochemicals; Functional foods

**Highlights:**

- Rutin protected thyroid peroxidase against cassava-derived inhibitory metabolites.
- phytochemicals showed stronger binding than cyanide metabolites.
- Findings support functional food strategies for cassava-consuming populations.

## BACKGROUND AND OBJECTIVES

Cassava is one of Nigeria's most important staple foods and contributes substantially to household food security. However, inadequate processing leaves residual cyanogenic compounds that are metabolized into hydrocyanic acid (HCN) and thiocyanate (SCN), both of which inhibit thyroid peroxidase (TPO), the key enzyme involved in thyroid hormone synthesis. This mechanism may contribute to the persistence of iodine deficiency disorders in some cassava-consuming communities despite successful salt iodization programmes [1,2]. Identification of naturally occurring dietary compounds capable of protecting TPO offers a sustainable nutritional strategy for improving thyroid health while supporting safe utilization of cassava. This study seek to address such challenges using selected dietary phytochemicals on enzyme kinetics and molecular docking analyses.

## MATERIALS AND METHODS

Porcine thyroid peroxidase activity was evaluated using Michaelis–Menten and Lineweaver–Burk kinetic analyses. Molecular docking was performed using Schrödinger Suite (2020) with human thyroid peroxidase (PDB ID: 1PRX). Selected dietary phenolics and flavonoids (rutin, quercetin, epicatechin, chlorogenic acid and gallic acid) were evaluated alongside HCN and SCN. Ascorbic acid and methylimidazole served as reference compounds. Antioxidant activities of selected phytochemicals were also assessed.

## RESULTS AND DISCUSSION

Normal thyroid peroxidase exhibited classical Michaelis–Menten kinetics (Vmax = 0.014126 $Ms^{-1}$; Km = 0.001297 M; Kcat = 5.389 $s^{-1}$). Hydrocyanic acid and thiocyanate inhibited TPO activity, whereas several

dietary phytochemicals significantly modulated enzyme activity. Most phytochemicals produced mixed or non-competitive interactions by binding outside the catalytic site. HCN, SCN, epicatechin, chlorogenic acid, quercetin and gallic acid interacted with the common residue ALA-151, whereas rutin functioned as an allosteric activator, enhancing catalytic turnover through interaction with alternative amino acid residues.

Docking studies demonstrated stronger binding affinities for dietary phytochemicals (−6.52 to −5.06 kcal/mol) than HCN and SCN (−3.58 to −3.04 kcal/mol) or ascorbic acid (−4.27 kcal/mol). Antioxidant activities followed a similar trend (gallic acid > rutin > catechin > quercetin), reinforcing the protective role of these compounds against oxidative stress associated with thyroid dysfunction. Collectively, these findings suggest that selected dietary phytochemicals may reduce cassava-associated thyroid dysfunction through complementary antioxidant and enzyme-modulating mechanisms.

## CONCLUSION AND RECOMMENDATION(S)

Selected dietary phytochemicals effectively modulated thyroid peroxidase activity and reduced the inhibitory effects of cassava-derived hydrocyanic acid and thiocyanate. Rutin emerged as the most promising compound, functioning as an allosteric activator of TPO and demonstrating potential as a functional food ingredient for populations that rely heavily on cassava. Increased consumption of polyphenol-rich foods should be encouraged as complementary strategies for reducing cassava-associated thyroid dysfunction

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**Sub Theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

# Title: Chemical Composition of Fermented Mature Unripe Plantain and Kaolin Clay Aqueous Extract

**Ogiri. A.[1] Chikwendu, J.N[2] Chukwuka O.F[3]**

**[1,2,3]Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.**

**Corresponding authors email: annogiri22@gmail.com Phone number +2348022536606**

**KEYWORDS: Chemical composition, fermented, unripe, plantain, kaolin clay, extract**

**Highlights:**

- The fermented mature unripe plantain antioxidant, phytochemicals and minerals
- The fermented mixture can be used for the treatment of peptic ulcer
- Kaolin Clay is easily digestible and possess antacid properties
- Mixture of the extract is useful in herbal medicine

**Background:** Plantain (*Musa paradisiaca*) is one of the interesting tropical plants consumed for centuries by humans and animals as nutritious food (4). Traditionally, the different parts (root, leaf, fruit, stem, flowers) possesses a number of biological activities. (2). It is also useful in herbal medicine to treat peptic ulcer disease. Kaolin clay (Edible clay) is a clay mineral, that is easily digestible and the particle sizes of the clay makes it suitable to form coatings in the gastro-intestinal tract and is the active ingredient in anti-diarrhea medicine Kaopectate (3). The use of herbal medicines like fermented unripe plantain and kaolin clay mixture is used by people traditionally to treat different diseases. The study is analyzed the chemical composition of fermented mature unripe plantain and kaolin clay aqueous extract.

**Methodology**: The mature unripe plantain fruits and kaolin clay were separately washed. Plantain fruits were peeled and cut into thin slices and kaolin was grounded into fine powder. Two hundred grams (200g) of the plantain and kaolin clay were separately fermented in 1000ml of distilled water for 72 hours and filtered using mesh sieve (100 micrometre) to obtain the fermented aqueous extracts. The proximate, vitamin, mineral, phytochemical and anti-nutrient composition of the aqueous were analyzed using standards methods (1). Data was described with mean and standard deviation. Analysis of variance and Duncan's new multiple range test were used to separate the means and a significant level was set at ($p < 0.05$).

**Results and discussion**:

**Table 4.1: Proximate composition of fermented mature unripe plantain and kaolin clay aqueous extract (%)**

| Nutrient | Kaolin clay | Mature unripe plantain |
|---|---|---|
| Moisture | 97.20±0.04 | 97.64±0.03 |
| Protein | 0.42±0.08 | 0.73±0.01 |
| Ash | 1.20±0.05 | 0.70±0.10 |
| Fats | 0.96±0.01 | 0.73±0.00 |
| Fibre | 0.00±0.00 | 0.00±00 |
| CHO | 0.24±0.10 | 0.22±0.13 |

Results are expressed as Mean ± SD.

The results showed the proximate composition of fermented kaolin clay and mature unripe plantain aqueous extract. The moisture content of fermented kaolin clay was 97.20%, while fermented mature unripe plantain was 97.64%. The result also shows that the ash, fats, fibre, protein and carbohydrate content of fermented kaolin clay and mature unripe plantain aqueous extracts were 1.20% and 0.70%, 0.96% and 0.73%,0.00% and 0.00%, and 0.40% and 0.71%, 0.24% and 0.22% respectively. The extract also contains a good amount of beta carotene, vitamin C, iron, copper, potassium, zinc, calcium, tannin, phytate, oxalate, alkaloids and flavonoids. The results from this study confirms the efficacy of fermented kaolin clay and mature unripe plantain aqueous extract that it possesses a potent ulcer healing effect, which could be attributed to the free radical scavenging activity of the phytochemical constituents as well as the antioxidant, mineral and vitamin present in both fermented kaolin clay and mature unripe plantain aqueous mixture.

**Conclusion**: The study showed that fermented mature unripe plantain contained significant amount of micro and macro nutrients while the kaolin clay had appreciable amount of the analyzed nutrients.

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**Sub Theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

# Title: Development and Assessment of Nutrition Software Application on Indigenous Foods in South-East Nigeria

**Ogiri. A.[1] Chikwendu, J.N[2]**

**[1,2]Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.**

**Corresponding authors email: annogiri22@gmail.com Phone number +2348022536606**

**KEYWORDS: Indigenous foods, software Application, Development, Assessment.**

**Highlights:**

- Respondents accepted the design, functionality and the interface of the App
- It was rated as a user-friendly App
- Respondents were willing to continue the usage and learn more about the developed App
- Knowledge about nutrition Apps/software in Nigeria is still very low

**Background:** Mobile health (m-health) has evolved into a central part of everyday life and is becoming an important part of people's lives. Though, some of these information on the APP do not come from trained professionals (dietitians and nutritionist), or have indigenous foods incorporated in them therefore limiting its usage not just in Nigeria but Africa which impedes the promotion of indigenous foods (4). This study aimed at the development and assessment of nutrition software application on indigenous foods in South-east Nigeria.

**Methodology:** A quasi-experimental survey design was used. The system software design process was divided into architectural design, high-level design and the detailed design phases. Each component of the App was developed in modules, the functions of the App were presented in a use case diagram, the user interface and database were designed using Lucidchart and structured query language (SQL) workbench. Chart Maker was used to draw the entity relationship diagram, Algorithms, Class Diagrams, Unified Modeling Language (UML) diagrams and the Dataflow Diagrams. The codes were written in Hypertext Markup Language (HTML), Cascading Style Sheet (CSS) and JavaScript (JS) to code the frontend while Preprocessor Hypertext Programing (PHP) was used for the server-side scripting for the backend. The App was hosted on an online webserver and accessible using any device. A total number of 315 respondents consented to participate in the survey. Multi stage sampling technique was used in selecting the respondents to evaluate the developed App. A validated structured online (Google form) questionnaire was used to obtain data from the respondents on socio-demographic information, nutritional knowledge, nutrition App usage and personal experience, computer and smartphone usage experience and user experience with the developed App. The collected data was exported into the statistical software, Statistical Product and Service Solutions (SPSS), version 23.0. Descriptive statistics was used to

analyse the socio-demographic information, nutrition knowledge, nutrition App usage and personal experience, computer and smartphone usage experience and user experience with the developed App. The result from the data analyses were presented in frequency and percentages.

Results and discussion: The developed App was easy to use by majority (91.7%) of the respondents which is in line with the study of (2; 5), which is a criteria for any App development. The design (74.6%), interface (73.0%) and functionality (73.3%) were rated excellent by most of the respondents, this aligns with the study by (Samrgandi, 2021). Respondents agreed that the developed App captured the indigenous foods in their locality (90.8%), which agrees with the study of (1) about the need to incorporate indigenous foods on Apps. About 83.5% respondents gained new knowledge about nutrition while using the App. Majority (92.1%) of the respondents were willing to continue the usage of the App and learn more about it (95.2%).

Conclusion: This study showed that the developed App/software, incorporated with Nigerian indigenous foods was accepted by users. The app was reported to be user friendly, had a good interface and the design was appreciated by the users

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**THEME: Delivering Better Nutrition for All: The Dots Across Life Cycles, Systems, & Sectors**

**SUBTHEME: Transforming Local Food Systems for Improved Food Security and Nutrition**

# TITLE: Formulation, Nutritional Profiling, and Quality Assessment of Groundnut-Fortified Yoghurt Samples Produced from Full-Cream Milk Powder

**AUTHORS: Abiodun, A.M.[1]***, Badamasi, O.F.[1], Omachi, B.A.[1] and Babalola, F.S.[1]

[1]Department of Nutrition and Dietetics, Federal Polytechnic, Bida, Niger State, Nigeria.

***Corresponding author:** abayiodun@gmail.com; +2347032090783

**Keywords:** Groundnut (*Arachis hypogaea*), Yoghurt, PDCAAS, Oxidative Stability

**Highlights:**

- 80:20 FCMP:Groundnut ratio produced optimum nutritional and sensory quality.
- PDCAAS declined with increasing groundnut substitution above 20%.
- Vitamin E improved oxidative stability during refrigerated storage.

## BACKGROUND AND OBJECTIVES

Yoghurt is a widely consumed fermented dairy product that provides high-quality protein, calcium and beneficial probiotic microorganisms, making it an important component of healthy diets [1]. However, conventional dairy yoghurt contains predominantly saturated fat and lacks dietary fibre, while the increasing demand for healthier, affordable and sustainable foods has stimulated interest in dairy–plant composite products [2,3].

. This study therefore formulated groundnut-fortified yoghurt at different substitution levels and evaluated its nutritional profile, predicted Protein Digestibility Corrected Amino Acid Score (PDCAAS), sensory quality and oxidative stability during refrigerated storage.

## MATERIALS AND METHODS

Full-cream milk powder, roasted groundnut paste, commercial yoghurt starter culture (*Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus thermophilus*) and vitamin E (d-α-tocopherol) were used for the study. Four yoghurt formulations containing full-cream milk powder and groundnut paste at ratios of 90:10, 80:20, 70:30 and 60:40 (w/w) were produced and standardized to a final fat content of 3.5%.

Proximate composition was determined using standard AOAC procedures, while amino acid composition was analysed using High Performance Liquid Chromatography (HPLC). Protein quality was estimated as PDCAAS using weighted digestibility coefficients for milk and groundnut proteins. Sensory evaluation was conducted using a five-point hedonic scale. Oxidative stability during refrigerated storage was monitored using peroxide value, with vitamin E incorporated at 200 mg/kg of product. Data were analysed using one-way Analysis of Variance (ANOVA), and treatment means were separated at $p < 0.05$.

## RESULTS AND DISCUSSION

**Table 1:** Amino acid profile of groundnut-fortified yoghurt (mg/100 g)

| Amino acid | 90:10 | 80:20 | 70:30 | 60:40 |
|---|---|---|---|---|
| Isoleucine | 145[a] | 124[b] | 104[c] | 85[d] |
| Leucine | 279[a] | 236[b] | 195[c] | 155[d] |
| Lysine | 235[a] | 198[b] | 162[c] | 127[d] |
| Methionine | 69[a] | 59[b] | 49[c] | 40[d] |
| Cystine | 22[c] | 23[b] | 24[ab] | 25[a] |
| Total SAA | 91[a] | 82[b] | 73[c] | 65[d] |
| Phenylalanine | 134[a] | 120[b] | 107[c] | 93[d] |
| Tyrosine | 134[a] | 116[b] | 99[c] | 82[d] |
| Total AAA | 268[a] | 236[b] | 206[c] | 175[d] |
| Threonine | 134[a] | 111[b] | 89[c] | 68[d] |
| Tryptophan | 39[a] | 33[b] | 27[c] | 22[d] |
| Valine | 179[a] | 151[b] | 124[c] | 98[d] |
| Histidine | 80[a] | 72[b] | 64[c] | 56[d] |
| Arginine | 97[d] | 135[c] | 174[b] | 212[a] |
| Alanine | 89[c] | 93[b] | 98[ab] | 102[a] |
| Aspartic acid | 223[d] | 238[c] | 254[b] | 269[a] |
| Glutamic acid | 603[d] | 641[c] | 680[b] | 718[a] |
| Glycine | 52[d] | 61[c] | 70[b] | 79[a] |
| Proline | 279[a] | 245[b] | 269[ab] | 181[c] |
| Serine | 167[a] | 149[b] | 132[c] | 114[d] |
| **Total amino acids** | **2899** | **2900** | **2905** | **2908** |

*Means within the same row bearing different superscripts differ significantly ($p < 0.05$).*

These findings reflect the characteristic amino acid composition of groundnut protein and are consistent with previous reports on legume-enriched dairy products [3,4]. Although total amino acid content remained stable, excessive groundnut substitution reduced the balance of essential amino acids and consequently lowered the predicted PDCAAS.

## CONCLUSION AND RECOMMENDATION

Groundnut fortification improved the nutritional quality of yoghurt while maintaining acceptable sensory characteristics and oxidative stability at moderate substitution levels.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Topic:** School+Home garden-based nutrition education intervention to improve knowledge, vegetable consumption and micronutrient intake of school-age children in public primary schools in Ibadan

**Name of Authors:** Ejoh, S.I.[1], and *Aluko H.A.[1]

[1]Department of Human Nutrition and Dietetics, University of Ibadan

**Corresponding author, e-mail**: hannahaluko2@gmail.com, +2347032979361

**Keywords:** School-garden, Nutrition education, Vegetable intake, Micronutrients

**Highlights**

- Nutrition knowledge scores increased significantly after intervention ($p<0.001$)
- Consumption of vegetables improved more with school-plus-home garden group
- Micronutrient intake did not increase despite improved knowledge scores

## BACKGROUND AND OBJECTIVES

Low consumption of vegetables and fruits has been associated with unhealthy dietary patterns and an increased risk of non-communicable diseases. Improving vegetable intake during childhood is therefore important for establishing healthier eating habits and promoting long-term health. [1].

A number of studies have also demonstrated that food choices made in childhood tend to persist throughout the life span, impacting on food choices later in life [2] Furthermore, a study carried out on food sources of key nutrients and dietary pattern of school-age children in Ibadan reported that vegetables made a very low contribution to the key micro-nutrients indicating the low consumption of vegetables among this age group [3].

This study assessed the effect of home-plus-school garden-based nutrition education on the knowledge, consumption and micronutrient intakes of school-aged children in Ibadan.

## MATERIALS AND METHOD

A quasi-experimental method was used, pre-test/post-test design, with an intervention school (School+Home garden-based nutrition education) and a control school (nutrition education only) over a six-week study period. At baseline and end line, nutrition knowledge and vegetable knowledge/identification and frequency of vegetable consumption was measured using structured questionnaires. Twenty-four-hour dietary recall was also collected and was analyzed with ESHA Food Processor.

## RESULTS AND DISCUSSION

There was a significant increase in mean nutrition-knowledge scores in both schools following intervention and an increase in Vegetable nutrient knowledge score ($p<0.001$ in both group), plus an increase in mean vegetable consumption frequency, though the between-group difference was not significant ($p=0.317$). The findings of this study are consistent with those reported by [1], which reported improved nutrition knowledge and vegetable-related knowledge among school-age children after a four-week garden-enhanced nutrition education program.

**Table 1.0: Mean nutrition knowledge score before and after the intervention**

| Group | Baseline mean (SD) | Endline mean (SD) | p-value |
|---|---|---|---|
| Intervention (garden-based) | 12.67 (1.62) | 19.31 (1.70) | <0.001 |
| Control (nutrition education only) | 13.69 (2.05) | 19.63 (1.66) | <0.001 |

## CONCLUSION AND RECOMMENDATION

Nutrition knowledge, vegetable consumption and vegetable-nutrient knowledge were significantly increased after the six-week study period among the intervention and control group, although there was limited evidence of an increase in the intake of micronutrients over the study period. This indicates that knowledge and attitude change happen rapidly, however, extended intervention time is required before the changes in knowledge and attitude are reflected in actual improvements in micronutrient intake. School garden-based nutrition education coupled with home garden intervention and study conducted over an extended time period (at least an entire school year)is recommended to improve the micronutrient intake of school-aged children

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**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Food Insecurity, Coping Strategies, and Depression among Low-Income Earners in Gwagwalada Area Council, Abuja, Nigeria

**Authors:** Essien, M.[1], Jidda, K.[2], Makinde, J.O.[1], Manawa, O.[1], Ajibade, C.A.[1*] and Ariyo, O.[1]

**Affiliation of authors:** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo State, Nigeria [2]Department of Health Promotion and Environmental Health Education, University of Ilorin, Kwara State, Nigeria.

***Corresponding author:** cornellajibade@gmail.com +2348162188767

**Keywords: Food Insecurity, Coping Strategies, Depression, Low-Income Earners**

**Highlights**:

- Nearly two-thirds (63.5%) of respondents experienced severe food insecurity, while 81.7% reported minimal depression
- Respondents earning below ₦50,000 monthly had nearly 11 times higher odds of food insecurity than those earning above ₦100,000 (AOR=10.8; p<0.001).
- Severely depressed respondents had higher odds of food insecurity

**BACKGROUND AND OBJECTIVES**: Food insecurity remains a critical public health challenge, affecting an estimated 673 million people globally in 2024 [1]. In Nigeria, about 30.6 million people across 26 states and the Federal Capital Territory are projected to face acute food and nutrition insecurity, driven by insecurity, economic shocks, inflation, and climate-related hazards [2]. Beyond its nutritional consequences, food insecurity is increasingly recognised as a key social determinant of mental health, triggering coping strategies that heighten psychosocial stress and depressive symptoms. However, evidence from Nigeria linking food insecurity, coping strategies, and depression among low-income earners remains limited. This study assessed the prevalence of food insecurity, coping strategies, and depression, and examined the association between food insecurity and depression among low-income earners in Gwagwalada Area Council, Abuja, Nigeria.

**MATERIALS AND METHODS**: A descriptive cross-sectional study was conducted among 323 low-income adults selected using a multi-stage sampling technique across five wards in Gwagwalada Area Council, Abuja. Data were collected using a structured, interviewer-administered questionnaire. Food security status was assessed using the Food Insecurity Experience Scale Survey Module (FIES-SM) and categorised as food secure (≤3), moderately food insecure (4–6), and severely food insecure (7–8). Coping strategies were assessed using the Coping Strategy Index (CSI) and categorised as low (<40), medium (41–80), and high (>80). Depression was assessed using the 21-item Beck Depression Inventory-II (BDI-II). Data were analysed using descriptive statistics, chi-square test, and binary logistic regression (α 0.05).

**RESULTS AND DISCUSSION**: Respondents' mean age was 36.53±10.9 years and 61.3% earned below ₦50,000 (≈US$35) monthly. Nearly two-thirds (63.5%) of respondents experienced severe food insecurity, 23.2% experienced moderate food insecurity, and only 13.3% were food secure. The median Coping Strategy Index score was 65 (IQR: 29–99), reflecting medium-to-high household coping intensity, while 81.7% reported minimal depression (Figure 1). In the adjusted model, respondents earning below ₦50,000 had nearly 11 times higher odds of food insecurity than those earning above ₦100,000 (AOR=10.8; 95% CI: 3.52–33.1; p<0.001), while severely depressed respondents had higher, though not statistically

significant, odds of food insecurity (AOR=4.07; 95% CI: 0.80–20.9; p=0.09). These findings mirror the bidirectional food insecurity-depression relationship reported elsewhere, driven by financial constraints, unstable employment, and psychosocial stress, underscoring the need for integrated economic and mental health interventions among low-income urban populations.

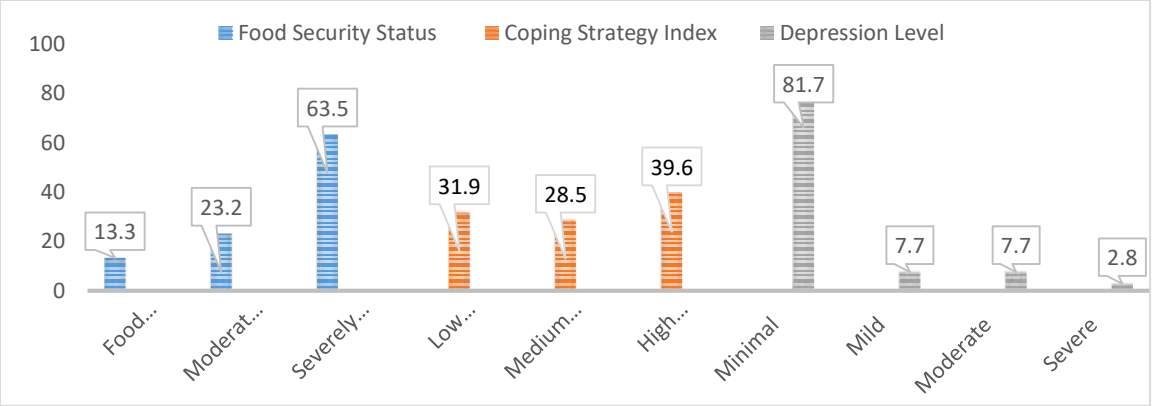



**Figure 1: Distribution of Food Security Status, Coping Strategy Index, and Depression among Respondents (N=323)**

**CONCLUSION AND RECOMMENDATION(S)**: Food insecurity remains highly prevalent among low-income earners in Gwagwalada. Although higher odds of food insecurity were observed among respondents with severe depression, this association was not statistically significant and remains uncertain. Integrated food security and mental health interventions targeting low-income urban populations are recommended.

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**Sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

# Bridging the Gap in Nigeria's Food Fortification Programme: Household Evidence on Coverage, Awareness, and New Opportunities for Impact in Northern Nigeria

[1*]Mode, A.M., [2]Umar, A.I., [3]Abdullahi, H.S., [3]Aliyu, M.M., [4]Lawal, A., [4]Wasagu, R.S.U., [3]Umar, R.A.
[1]Centre for Advanced Science Research and Analytical Services, Usmanu Danfodiyo University, Sokoto, Nigeria.
[2]Department of Biochemistry and Molecular Biology, Sokoto State University, Sokoto.
[3]Department of Human Nutrition and Dietetics, Usmanu Danfodiyo University, Sokoto.
[4]Department of Biochemistry and Molecular Biology, Usmanu Danfodiyo University, Sokoto.
***Corresponding author** E-mail: abduljalil.mode@udusok.edu.ng (+2348032561547)

**Keywords:** Food fortification; Micronutrient deficiency; Household; Nigeria.

**Highlights:**

- Fortified foods were widely consumed, but reliance on unbranded, likely unfortified products and low awareness of fortification limited impact.
- High consumption of bouillon and maize flour indicates strong potential as additional fortification vehicles.

## BACKGROUND AND OBJECTIVES

Food fortification involves adding vitamins and minerals to staple foods to reduce micronutrient deficiencies [1]. Nigeria's food fortification program stipulates mandatory fortification of salt, wheat flour, maize flour, semolina, sugar, and vegetable oil [2]. However, limited data on household coverage, consumption, and awareness limit the assessment of the program's effectiveness and identify expansion needs. This study, therefore, assessed coverage, consumption, awareness, and potential new food vehicles.

## MATERIALS AND METHODS

A cross-sectional survey in Kebbi, Sokoto, and Zamfara States sampled 3,268 households using a two-stage design (Enumeration Areas and households) to assess fortified food coverage, consumption, awareness, and the potential for new fortification vehicles.

## RESULTS AND DISCUSSION

This study assessed fortified food coverage, consumption, awareness, and new food vehicle options (**Figures 1A–D, 2A–D**). Although staple foods are widely consumed, reliance on unbranded, unfortified products limits fortification impact and sustains nutrient deficiencies [3,4]. Low awareness and poor understanding of fortification further reduce effectiveness [3]. Expanding access, strengthening compliance, and improving regulation, monitoring, and public education are essential to achieve meaningful health impact.

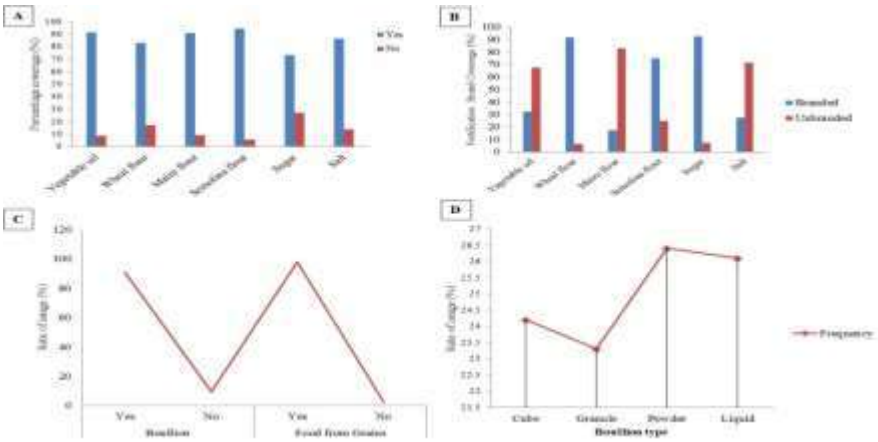


**Figure 1A–D:** The **e**ffectiveness of food fortification programs in Kebbi, Sokoto, and Zamfara States. (A) Household coverage of fortified foods; (B) Availability of fortified food brands in households; (C) Potential new food vehicles for fortification based on household consumption patterns; (D) Types of bouillon consumed. Bars and lines show the percentage of responses (n = 3,268).

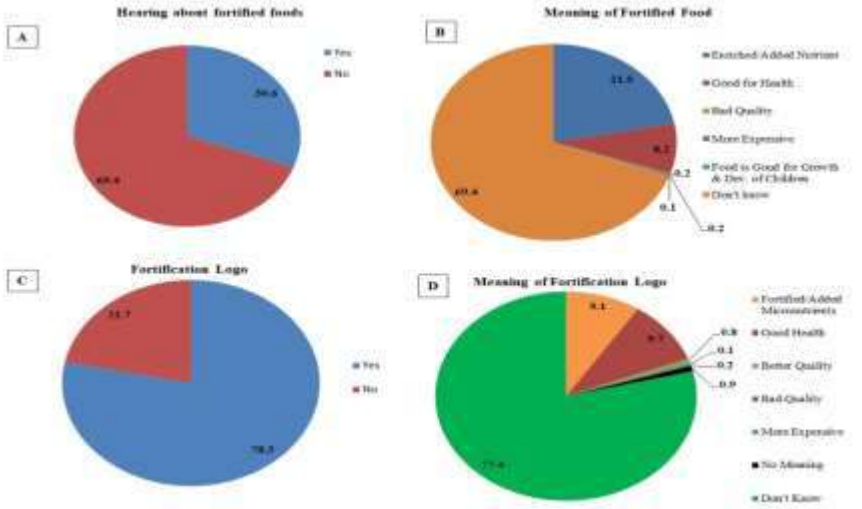



**Figure 2A–D.** Households' awareness and knowledge of food fortification programs in Kebbi, Sokoto, and Zamfara States: (A) household awareness of fortified foods; (B) household understanding of the meaning of fortified foods; (C) household recognition of the fortification logo; and (D) household understanding of the meaning of the fortification logo. Bars and lines represent the percentage of respondents' responses (n = 3,268).

## CONCLUSION AND RECOMMENDATIONS

High staple intake enables fortification, but low awareness and unbranded products reduce impact. Broader fortification, stronger regulation, and better awareness could improve intake.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition
**Title:** Fatty acid and amino acid profile of *Poga oleosa Pierre* (African Brazil nut) in Abo-Ogbagante, Boki Local Government Area, Cross River State, Nigeria.
**Name of author:** [1]Bessong, M.O., [1]Adesuyan A. J. and [2]Ukam, N.U.
**Affiliation of Author(s):** [1]Department of Home Economics, Faculty of Vocational and Entrepreneurial Education, University of Calabar, Calabar, Nigeria.
[2]Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences, University of Calabar, Calabar, Nigeria.
**Keywords:** *Poga oleosa Pierre,* amino acid profile, and fatty acid profile.
**Highlights:**

- In this study, the fatty acid profile of *poga oleosa* Pierre showed high concentrations of oleic acid (59.06±0.08g/100g); linoleic acid (18.54±0.07 %) and hexadecanoic acid (11.31± 0.13%).
- The amino acid result showed that *Poga oleosa* Pierre nut has low aspartic acid content of 8.15±0.03 mg/100g, leucine 7.11±0.001 and lysine 4.15±0.04.

**BACKGROUND AND OBJECTIVES:**

*Poga oleosa Pierre* an under-utilized nut, is also a ready-to-eat nut. Being an oil seed, the nuts can be processed to extract oil for cooking, soap making and for medicinal purposes Therefore, the study evaluates the amino acid and fatty acid profile, of *Poga oleosa* Pierre.

**MATERIALS AND METHOD:**

*Poga oleosa* Pierre (African Brazil nut) was collected from the rain forest zones of Abo-Ogbagante, Boki Local Government Area, Cross River State. They were processed, grounded and packaged for analysis. Amino acid analysis was carried out using AOAC (1) method with modifications. Gas chromatography and HPLC techniques were used for fatty acid analysis Statistical analysis was performed using SPSS version 21.0 version. Results were expressed as mean SEM ± SD of triplicate samples.

**RESULTS AND DISCUSSION:**

**Table1: Fatty composition of *Poga oleosa Pierra* (mg/100g) edible portion**

| **Parameters** | **Mean ± SEM** |
|---|---|
| Tetradecanoic acid ($C14H_{28}O_2$) | 0.099±0.003 |
| Hexadecanoic (C16, $H_{12}O_2$) | 11.31±0.13 |
| Stearic acid ($C18H_{34}O_2$) | 6.14 ± 0.04 |
| Oleic Acid (C18:1) | 59.06 ± 0.08 |
| Linoleic acid (C18:2) | 18.54 ± 0.07 |
| Iodine value | 62.58 |

**Values are expressed as Mean ±SEM**

The result in table 1. showed that *Poga oleosa Pierre* had high concentrations of oleic acid (59.06±0.08g/100g); linoleic acid (18.54± 0.07 %) and hexadecanoic acid (11.31± 0.13%). The iodine content was 62.58% in *Poga* nut. This shows that the degree of unsaturation of the fats and oxidative

stability in *Poga oleosa* Pierre is recommendable. Research carried out by Etuk *et al*. (2) showed similar iodine value.

**Table 2: Amino acid composition *Poga oleosa Pierra* (mg/100g) edible portion**

| **Parameters** | **Mean ± SEM** |
|---|---|
| Aspartic acid | 8.15±0.03 |
| Leucine | 7.11±0.001 |
| Lysine | 4.15±0.04 |
| Isoleucine | 3.41±0.03 |
| Phenylalanin | 4.63±0.00 |
| Tryptophane | 1.08±0.01 |
| Valine | 3.81±0.03 |
| Methionine | 1.34±0.04 |
| Arginine | 6.22±0.02 |
| Proline | 3.67±0.04 |
| Tyrosine | 3.45±0.00 |
| Norleucine | 0.00±0.00 |

**Values are expressed as Mean ±SEM**

The result in table 2 showed the amino acid that has the highest concentration in the nut was aspartic acid (8.15±0.03 mg/100g). Tryptophan had the lowest amount in all the amino acids analyzed (1.08±0.01mg/100g). Norleucine was not detected in the sample.

## CONCLUSION AND RECOMMENDATION(S):

*Poga oleosa Pierre* nut had a high content of amino acid which can positively influence a wide range of biological properties. It also contains high levels of monounsaturated fats with predominance in oleic acid and linoleic acid. Policymakers and health practitioners should consider incorporating *Poga oleosa pierre* nut into nutrient composition table to enhance micronutrient intake at the population level for improved food security.

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**SUBTHEME:** Transforming Local Food System For Improved Food Security And Nutrition.

**TITLE OF PAPER:** Nutritional Composition and Microbial Safety of Locally Packaged Complementary Foods in Ibadan Metropolis

[1]Adebisi S.D., [*]Ibidapo E.G., and [1]Samuel F. O.

[1]Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria.

*Corresponding Author: ibidapoebunoluwa@gmail.com*

**Keywords:** Complementary feeding, Food safety, Locally-packaged Complementary Foods, *Tom Brown*

**Highlights**

- High protein content of locally packaged complementary foods (LPCFs) met Codex Alimentarius standard.
- Antinutrient levels of LPCFs were negligible, indicating effective traditional processing methods.
- Microbial quality of LPCFs was within acceptable safety limits, with no detectable *Salmonella.*

## BACKGROUND AND OBJECTİVES

Unsafe complementary foods contribute significantly to malnutrition and foodborne illnesses among infants and young children (IYCs). The utilization of locally packaged complementary foods (LPCFs) is prevalent among caregivers in low and middle-income countries, often driven by affordability, availability, convenience, and cultural acceptability. However, limited evidence exists on their macro- and micro-nutrient composition and microbial safety. This study assessed the nutrient composition and microbial safety of LPCFs used for feeding infants and young children within Ibadan metropolis.

## MATERIALS AND METHODS

This descriptive cross-sectional study analyzed five (5) unique LPCFs popularly referred to as *Tom Brown* mixes obtained from stores within healthcare facilities across four (4) local government areas in Ibadan metropolis. Proximate analysis evaluated macro- and micronutrient composition, while antinutrient and microbiological safety levels were determined using standard methods. Analyses were conducted in triplicate, and results were summarized as means, standard deviations and percentages, and compared with established standards.

## RESULTS AND DISCUSSION

The LPCFs showed high protein content (40.88 ± 0.09%-44.18 ± 0.11%), exceeding both the 15% Codex Alimentarius minimum and the 8-15% typical of cereal-based complementary foods. This is higher than the protein content reported in a study conducted in a similar setting [1]. Iron content ranged from 134.6-155.0 mg/kg, zinc from 56.05 ± 0.015-74.08 ± 0.030 mg/kg, and vitamin A from 1367.57 ± 0.01-1504.18 ± 0.03 IU/100g. Antinutrients (phytate, oxalate, saponin, tannin) were minimal (<0.01%), contrary to findings from other studies [2], thus reflecting effective traditional processing. Microbiological analysis showed acceptable safety levels as follows: Staphylococcus ($2.14\times10^3$ ± 0.01-$2.54\times10^3$ ± 0.02 CFU/g), E. coli ($1.19\times10^1$ ± 0.01-$1.67\times10^1$ ± 0.02 CFU/g), and no detectable Salmonella, comparing favourably with contamination levels reported for complementary foods elsewhere in West Africa [3]

**Table 1: Comparison of study findings with Codex Alimentarius Standard**

| S/N | Parameter | Study findings | Codex Alimentarius standard | Compliance |
|---|---|---|---|---|
| 1 | Protein (%) | 40.88-44.18 | ≥15% | Exceeds |
| 2 | *Salmonella* | Not detected | Absent in 25g | Yes |

*Codex Standard for Processed Cereal-Based Foods for infants and Young Children (CXS 74-1981, Revised)*

## CONCLUSION AND RECOMMENDATİON(S):

The LPCFs evaluated demonstrated nutrient compositions and microbial profiles largely consistent with established standards for complementary feeding. However, given the limited sample size and observed variability, broader surveillance and strengthened regulatory oversight are warranted to safeguard the health of infants and young children. Further studies with larger samples and broader geographical coverage are recommended to generate more representative evidence on LPCF quality in Nigeria.

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# SUB-THEME 1: POSTER

Sub-theme: *Transforming Local Food Systems for Improved Food Security and Nutrition*

NUTRITIONAL COMPOSITION AND MICROBIOLOGICAL QUALITY OF STREET-VENDED BEAN CAKE (AKARA) SOLD IN KEFFI METROPOLIS, NASARAWA STATE, NIGERIA

Oche P. I.[1], Samuel E. A.[2], Makanjuola D.A.[1], Anigo K.M.[3], Paul-Edeh J.[1], Lama C. M.[4,] A. O. I.[5]

[1]Department of Nutrition and Dietetics & [2]Department of Animal Science, Nasarawa State University; [3]Department of Biochemistry, University of Abuja, Gwagwalada, Abuja.

[4]Department of Nutrition and Dietetics, Plateau State College of Health Technology Zawan. [5]Department of Nutrition, National Primary HealthCare Development Agency, Abuja

[1]Corresponding Author: ilemioche@gmail.com; 08034551734

Keywords: Bean cake (Akara), Proximate composition, Microbial quality, Food safety, Street foods

**BACKGROUND AND OBJECTIVE**

Bean cake (*akara*) is a popular street-vended food in Nigeria, providing affordable dietary protein. Differences in processing and poor hygiene may compromise its nutritional quality and safety, increasing foodborne illness risk [3]. This study assessed the proximate composition and microbiological quality of *akara* sold in selected locations in Keffi Metropolis, Nasarawa State.

**MATERIALS AND METHODS**

Bean cake samples were randomly collected from three major vending locations. Proximate composition was analysed using standard procedures, while yeast and mold counts were determined using standard microbiological techniques. Data were expressed as mean ± standard deviation and analyzed by one-way ANOVA with significance at $P < 0.05$ [1].

**RESULTS AND DISCUSSION**

Proximate analysis demonstrated variation in nutrient composition among samples, indicating differences in ingredient composition and frying practices. Sample C (Table 1) showed the highest moisture content (12.97%), and a yeast/mold count of 5 cfu/g (fig. 1), indicating possible contamination associated with poor handling or environmental exposure during processing and vending [3]. Although microbial counts were low, the presence of fungal contaminants underscores the need for stricter hygiene and food safety practices among street-food vendors. In a comparative study by Owo *et al*., 2025, it was observed that nutrient variability and microbial contamination in street-vended foods underscored food safety concerns due to ingredient composition and processing practices.

Table 1: **Total Yeast/Mold Count in Samples A, B and C**

| S/N | Sample | Total Yeast/Mold Count (cfu/g) | USP Acceptable limit ($<10^2$cfu/g) |
|---|---|---|---|
| 1 | A | Absent | Absent |
| 2 | B | Absent | Absent |
| 3 | C | 5 | Absent |

Analysis of the akara samples showed that only Sample C did not meet the USP acceptable limit for mold. The presence of yeast and mold in this sample likely resulted from poor handling and environmental contamination. Similar studies have linked microbial contamination of akara to inadequate hygiene, packaging, and exposure to unsanitary conditions [3].

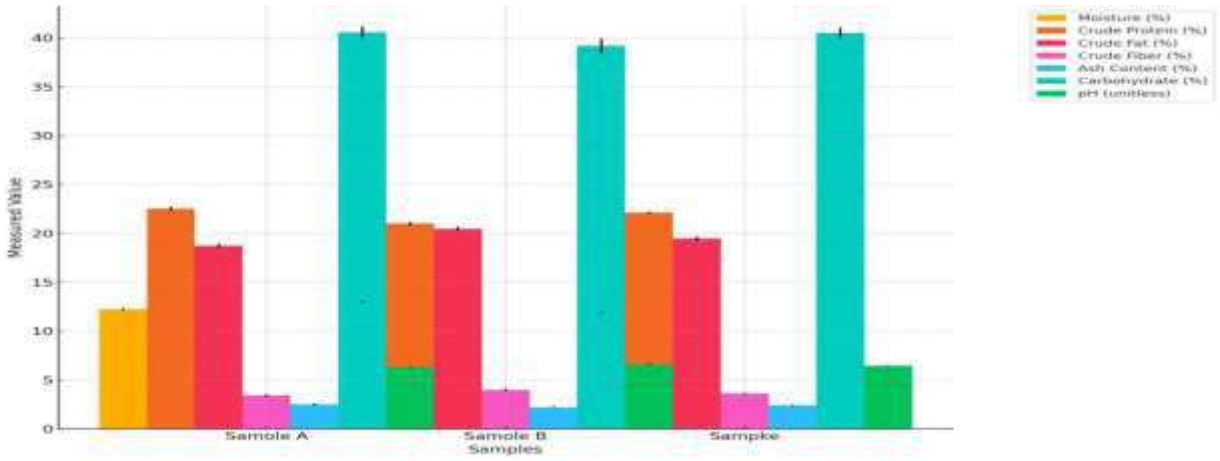



Figure 1: Graphical Representation of Proximate Analysis of Samples

Proximate analysis of the samples revealed that Sample C recorded the highest moisture content (12.97%), which may predispose it to reduced shelf life and greater microbial susceptibility, as elevated moisture facilitates microbial growth. Comparable studies have reported similar variability in proximate composition across food samples [1].

## CONCLUSION AND RECOMMENDATIONS

Street-vended *akara* sold in Keffi Metropolis provides affordable source of dietary protein but shows nutritional variations and microbial contamination risks. Improved hygiene, standardized preparation, behaviour change communication and routine monitoring are needed. Such measures will enhance product quality, food safety and nutrition security in Nigeria

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**Theme:** Delivering Better Nutrition for All: Connecting the Dots across Life Cycle, Systems and Sectors

**Sub-Theme:** Transforming local food systems for improved food security and nutrition**.**

**Title**: Evaluation of sorghum, groundnut, crayfish and date mix blends in supporting optimal complementary feeding.

**Names of authors: Agbo E. C[1]., Enudi M.C[1], Okafor A.M[1]., Edeh R.I[1]**

**Affiliation of authors:** [1]Department of Nutrition and Dietetics University of Nigeria Nsukka

**Email:** eucharia.agbo@unn.edu.ng +2348039524986

**Key words:** Evaluation, Complementary feeding, mix blends

**Highlights**

- The flour blend contains higher amounts of moisture, protein and crude ash compared to commercial cerelac.
- The 50%, sorghum, 25% groundnut, 15% crayfish, 10% date mix had the highest energy.

**Background:** In many developing countries, including Nigeria, traditional complementary foods are often cereal-based, primarily made from staples like sorghum, maize, or millet. However, these foods are typically low in protein, energy, and essential micronutrients, contributing to the high prevalence of malnutrition among children under five (1). The study evaluated sorghum, groundnut, crayfish and date mix blends in supporting optimal complementary feeding.

**Methodology:** Quality dried sorghum, groundnut, crayfish, and date were purchased, identified, and processed into flours. The processed flours were coded as $S_{70}G_{15}C_{10}D_5$, $S_{60}G_{20}C_{10}D_{10}$, and $S_{50}G_{25}C_{15}D_{10}$ and the flour samples blended to three flour formulations in the ratios of 70:15:10:5, 60:20:10:10 and 50:25:15:10. Proximate, energy, vitamins A, $B_6$, C, and D and some minerals (calcium, iron, magnesium, and zinc) were determined in duplicates using standard procedures of Association of Official Analytical Chemists (2). Sensory evaluation of gruel made from the flour blends was conducted with 30 mothers from University of Nigeria, Nsukka. Data obtained were analyzed using one way ANOVA followed by Duncan's multiple range test and significance accepted at $p < 0.05$.

**Results and Discussion:** The statistical analysis revealed significant ($p<0.05$) differences in moisture, protein, fat, ash and fiber, while carbohydrate did not differ. Moisture, Protein, and ash content of all the formulated samples were higher than in Cerelac. The higher protein content in the complementary food samples in the present study aligns with the study of (3) and could be attributed to the incorporation of animal protein (crayfish) to the blend. Energy values was lesser in formulated food samples and ranged from 382.96 to 394.37kcal, with sorghum 50%, groundnut 25%, crayfish 15%,date 10% having the highest (394.37 kcal) . The energy and carbohydrate values though lesser than in Cerelac are of appreciable amount and aligns with the result of formulated complementary food by (4).

**Table 1: Proximate composition (%) of formulated complementary food made from sorghum, groundnut, crayfish, and date with Cerelac per 100g**

| Sample | moisture | Protein | Fat | Fibre | Ash | Carbohydrate | Energy |
|---|---|---|---|---|---|---|---|
| $S_{70}G_{15}C_{10}D_5$ | 8.80±0.23$^b$ | 16.00±1.32$^a$ | 8.05±0.10$^c$ | 0.35±0.03$^b$ | 3.25±0.07$^c$ | 63.55±1.22$^a$ | 390.63 |
| $S_{60}G_{20}C_{10}D_{10}$ | 8.39±0.20$^b$ | 16.96±1.01$^a$ | 6.44±0.11$^b$ | 0.42±0.01$^b$ | 3.50±0.00$^b$ | 64.28±0.94$^a$ | 382.96 |
| $S_{50}G_{25}C_{15}D_{10}$ | 7.31±0.27$^a$ | 16.74±0.45$^a$ | 8.79±0.03$^a$ | 0.54±0.01$^a$ | 4.55±0.07$^a$ | 62.07±0.14$^a$ | 394.37 |
| Cerelac | 0.21±00$^b$ | 14.50±00$^b$ | 11.00±00$^a$ | 5.00±00$^a$ | 2.37±00$^b$ | 63.50±00$^a$ | 435.00 |

Values = means ± S.D of duplicate determinations. Means with different superscripts along the columns are significantly ($p<0.05$) different.

$S_{70}G_{15}C_{10}D_5$ = Sorghum 70%: Groundnut 15%: Crayfish 10%: Date 5%, $S_{60}G_{20}C_{10}D_{10}$ = Sorghum 60%: Groundnut 20%: Crayfish 10%: Date 10%

$S_{50}G_{25}C_{15}D_{10}$ = Sorghum 50%: Groundnut 25%: Crayfish 15%: Date 10%

**Conclusion:**

The formulated complementary foods had higher amounts of moisture, protein and ash, compared to commercial Cerelac. Flour with sorghum 70%, groundnut 15%, crayfish 10% and date 5%, was the most generally acceptable.

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**SUB-THEME: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title: Physicochemical, functional and sensory characteristies of rice bran enriched gari**

*Uwandu, A.C.[1], Ekwu, F.C.[2], Ekumankama, E.O.[2], Kosobameji, S.O.[3]

[1]*Department of Human Nutrition and Dietetics, Alex Ekwueme Federal University Ndufu-Alike, Ikwo, Ebonyi State, Nigeria.*

[2]*Department of Food Science and Technology, Ebonyi State University, Abakaliki, Nigeria.*

[3]*Department of Human Nutrition and Dietetics, Ambrose Ali University, Ekpoma, Edo State, Nigeria.*

*Corresponding author's e-mail: amarachisom2@gmail.com, +2347037257754

**Keywords**: local food, enrichment, by-products, food security.

**Highlights**

- Sample blends recorded higher protein, fat, ash and fibre.
- Carbohydrate decreased with increase in rice bran. .

## BACKGROUND AND OBJECTIVES

Agricultural by-products represent an untapped opportunity to increase local food availability and affordability. This study develops and evaluates a low-cost enriched valorized gari formulated from cassava roots and rice bran, and explicitly assesses its potential contribution to household food security. Considering the popularity of gari and its ready-to eat nature, there is need to enrich its nutritional composition with readily available rice bran which is local agricultural by-product rich in the nutrients (vitamins, minerals, protein and other bioactive compounds) lacking in gari. Rice bran incorporation is a form of by-product valorization because it enhances the value and utilization of a nutrient-rich rice-milling by-product.

## MATERIALS AND METHODS

Gari was made from two improved cassava root varieties as well as a local *rubber species* cassava variety (TMS 4779, TMS 419 and Local) and blended with non-defatted stabilized rice bran (NSRB) in the ratio of 95:5, 90:10, 85:15, 80:20 of each cassava variety and non-defatted rice bran respectively. Gari from 100% TMS 4779, TMS 419 and local cassava varieties (LCV) were used as the controls. All samples were further milled into flour. Proximate composition and Hydrogen Cyanide Content (HCN) were determined by the procedure described in AOAC [1]. Caloric content, total titratable acidity, pH, bulk densities, swelling index and water absorption capacity were determined according to standard methods. Data collected were analyzed using ANOVA of a completely randomized design model. The means were separated using Duncan's new multiple range test. Significance was accepted at $p<0.05$.

## RESULTS AND DISCUSSION

Sample blends recorded significantly ($p<0.05$) higher protein, fat, ash and fibre than the controls (gari from 100% TMS 4779, TMS 419, LCV) respectively, suggesting that the addition of non-defatted stabilized rice bran effectively enhanced these macro-nutrients [2]. Carbohydrate decreased with increase in rice bran. No clear trend was observed for calorific values of samples, however samples blends recorded higher calorific values than the controls.

**Table 1: Proximate composition and chemical properties of rice bran enriched gari**

| Sample | Moisture | Crude fibreF | Ash | Protein | Carbohydra | Fat | Calorie | Hydrogen | Total titrat | pH |
|---|---|---|---|---|---|---|---|---|---|---|
| 419 A | 11.68$^{bc}$ ±0.01 | 2.00$^{de}$ ±0.01 | 1.00$^{f}$ ±0.01 | 1.44$^{e}$±0 .01 | 83.40$^{a}$ ±0.01 | 0.48$^{g}$ ±0.01 | 343.68$^{e}$±0.0 2 | 0.62$^{a}$±0. 01 | 1.05$^{a}$ ±0.02 | 4.38$^{c}$± 0.01 |
| 419 B | 11.70$^{b}$± | 2.68$^{c}$± | 1.91$^{c}$ | 3.78$^{d}$±0 | 80.50$^{a}$ | 1.43$^{e}$ | 349.99 | 0.61$^{a}$±0. | 0. | 4.56$^{bc}$ |
| 419 C | 10.30$^{g}$± 0.01 | 3.05$^{bc}$ ±0.01 | 1.79$^{d}$ ±0.01 | 4.33$^{d}$±0 .01 | 78.04$^{b}$ ±0.30 | 2.49$^{d}$ ±0.01 | 351.89$^{a}$±0.0 1 | 0.60$^{a}$±0. 01 | 0.85$^{c}$ ±0.02 | 4.73$^{b}$± 0.02 |
| 419 D | 12.01$^{a}$± | 3.33$^{abc}$ | 2.50$^{b}$ | 5.87$^{ab}$± | 73.09$^{d}$ | 3.20$^{c}$ | 344.64$^{de}$±0. | 0.57$^{ab}$±0. | 0.84$^{d}$ | 4.77$^{ab}$ |
| 419 E | 11.60$^{bc}$ | 3.61$^{b}$± | 3.25$^{a}$ | 6.13$^{a}$±0 | 71.31$^{e}$ | 4.10$^{b}$ | 46.66$^{cde}$±0.0 | 0.55$^{ab}$±0. | 0.83$^{cd}$ | 4.87$^{a}$± |
| 4779 A | 11.77$^{ab}$ ±0.01 | 2.10$^{d}$± 0.01 | 0.75$^{d}$ ±0.01 | 1.43$^{e}$±0 .01 | 83.39$^{a}$ ±0.01 | 0.56$^{fg}$ ±0.10 | 344.32$^{de}$±0. 02 | 1.25$^{d}$±0. 02 | 1.10$^{a}$ ±0.01 | 4.27$^{d}$± 0.02 |
| 4779 B | 11.01$^{e}$± 0.01 | 2.94$^{c}$± 0.01 | 1.70$^{d}$ ±0.01 | 3.69$^{d}$±0 .01 | 78.98$^{b}$ ±0.01 | 1.68$^{e}$ ±0.01 | 345.80$^{cde}$±0. 01 | 1.23$^{de}$±0. 01 | 0.99$^{ab}$ ±0.02 | 4.35$^{cd}$ ±0.02 |
| 4779 C | 10.60$^{f}$± 0.01 | 3.25$^{abc}$ ±0.01 | 1.50$^{d}$ ±0.01 | 4.28$^{d}$±0 .01 | 77.64$^{b}$ ±0.01 | 2.73$^{d}$ ±0.01 | 352.25$^{a}$±0.0 1 | 1.21$^{de}$±0. 02 | 0.95$^{b}$ ±0.01 | 4.78$^{ab}$ ±0.01 |
| 4779 D | 11.20$^{d}$± | 3.40$^{ab}$ | 2.35$^{b}$ | 5.69$^{ab}$± | 74.03$^{c}$ | 3.33$^{c}$ | 348.85$^{abc}$±0. | 1.20$^{de}$±0. | 0.84$^{cd}$ | 4.81$^{a}$± |
| 4779 E | 11.70$^{b}$± | 3.65$^{a}$± | 3.20$^{a}$ | 6.09$^{a}$±0 | 71.06$^{e}$ | 4.30$^{b}$ | 347.30$^{bcd}$±0. | 1.17$^{e}$±0. | 0.80$^{d}$ | 4.88$^{a}$± |
| Local A | 11.80$^{ab}$ ±0.01 | 1.50$^{e}$± 0.01 | 1.00$^{f}$ ±0.01 | 1.21$^{e}$±0 .01 | 83.69$^{a}$ ±0.01 | 0.80$^{f}$ ±0.01 | 346.80$^{cde}$±0. 02 | 1.47$^{b}$±0. 02 | 1.11$^{a}$ ±0.01 | 4.16$^{e}$± 0.02 |
| Local B | 11.30$^{d}$± | 2.30$^{d}$± | 1.20$^{e}$ | 3.00$^{d}$±0 | 80.50$^{b}$ | 1.54$^{e}$ | 347.40$^{cde}$±0. | 1.46$^{bc}$±0. | 0.93$^{b}$ | 4.30$^{cd}$ |
| Local C | 10.90$^{ef}$ ±0.01 | 2.80$^{c}$± 0.01 | 1.75$^{d}$ ±0.01 | 4.20$^{d}$±0 .01 | 77.55$^{b}$ ±0.20 | 2.80$^{d}$ ±0.01 | 352.20$^{a}$±0.0 1 | 1.45$^{bc}$±0. 02 | 0.84$^{cd}$ ±0.01 | 4.47$^{c}$± 0.01 |
| Local D | 11.00$^{e}$± 0.01 | 3.18$^{abc}$ ±0.01 | 2.45$^{b}$ ±0.01 | 5.43$^{c}$±0 .01 | 74.54$^{c}$ ±0.01 | 3.40$^{b}$ ±0.01 | 350.48$^{ab}$±0. 02 | 1.42$^{c}$±0. 02 | 0.87$^{c}$ ±0.02 | 4.64$^{bc}$ ±0.01 |
| Local E | 11.50$^{c}$± 0.01 | 3.52$^{ab}$ ±0.01 | 3.25$^{a}$ ±0.01 | 5.95$^{ab}$± 0.01 | 71.18$^{e}$ ±0.01 | 4.60$^{a}$ ±0.01 | 349.92$^{abc}$±0. 02 | 1.40$^{c}$±0. 10 | 0.80$^{d}$ ±0.02 | 4.73$^{ab}$ ±0.01 |

Superscript followed by the same letter is not significantly different at p>0.05. ± Standard errors of mean. A = 100% cassava roots variety (Control), B = 95% cassava roots variety + 5% rice bran, C = 90% cassava roots variety + 10% rice bran, D = 85% cassava roots variety + 15 % rice bran, E = 80% cassava roots variety + 20% rice bran.

Moisture and hydrogen cyanide contents were within the ranges expected for gari, irrespective of ratios of rice bran. Total titratable acidity increased as the pH of the gari samples decreased. Sample blends had swelling index and water absorption capacity comparable to the controls.

## CONCLUSION

Through enrichment, macro- and micro-nutrients that are lacking in cassava roots were incorporated into gari. Rice bran enriched gari takes an agricultural by-product we already produce in large amounts and use as waste, and exploit it into nutrition we actually need.

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**Theme/Sub-Theme: Transforming Local Food Systems for Improved Food Security and Nutrition**

**Title: Proximate, Functional and Sensory Properties of Stiff Dough Produced from the Blends of Ogi Residue, Okara Flour and Cassava Flour**

**Authors: *Chukwulaka, P.C.[1] and Nwosu, A.N.[1]**

**Affiliation of authors:** [1]Department of Food Science and Technology, Faculty of Agriculture, University of Nigeria, Nsukka, Enugu State, Nigeria.

***Corresponding author:** princesschukwulaka009@gmail.com, +2348136618925

**Keywords:** Sensory Acceptability, Nutrient-Dense Swallow Meal, Food Waste Reduction.

**Highlights**

- Ogi residue and okara were transformed into a nutritious Stiff dough (swallow meal)
- The blend of the stiff dough containing 70% ogi residue, 20% okara flour, and 10% cassava flour provided the best balance of nutritional value and sensory acceptability.

**BACKGROUND AND OBJECTIVES:** Food waste and food insecurity remains pressing global concerns[1]. This study evaluated the proximate analysis, functional, and sensory acceptability of stiff dough produced from blends of ogi residue, okara flour, and cassava flour, to valorise these under-utilised by-products into an economical, nutrient-dense staple food.

**METHODS:** Five flour blends were formulated by varying the proportions of ogi residue and okara flour, using cassava flour as a binding agent:100% ogi residue; 70:20:10; 60:30:10; 50:40:10 (ogi residue: okara: cassava); and 100% okara flour. The rationale for selecting the different flour blends was to idenitify the blend that will provide nutritional quality and sensory acceptability. The blends were analysed for proximate composition, functional properties, micronutrients, anti-nutritional factors, microbial load, and sensory characteristics. The data were analyzed using one way ANOVA at $p < 0.05$ statical difference. Duncan's new multiple range test was used as the post-hoc test. Proximate analysis were analyzed using AOAC method, micro nutrients used AAS, functional property used Onwuka (2018).

**RESULTS AND DISCUSSION:** Proximate analysis showed moisture content ranging from 7.53–9.12%, protein 15.57–35.54%, fat 4.79–18.59, fibre 17.20–28.28%, ash 0.50–1.50%, and carbohydrate 51.81–17.67%, with okara-rich samples exhibiting higher moisture, fat, protein, and ash, while ogi-rich samples were higher in fibre and carbohydrate. Functional properties revealed water holding capacity of 184.40–237.30%, gelatinisation temperature of 80.00–83.00°C, viscosity of 24.50–80.55. No coliform was found in the flour. The micro nutrient value for pro-vit A ranges from 0.38-0.54, iron 0.49-1.48. The anti-nutrient value range from Tanin 1.19-4,52, Saponin 40.13-298.15. Sensory evaluation showed significant differences ($p<0.05$) across its characteristics. The blend containing 70% ogi residue, 20% okara flour, and 10% cassava flour offered the most balanced combination of sensory appeal and nutritional value.

**Table 1: Proximate Analysis of Stiff Dough (Swallow Meal)**

| SAMPLE | MOISTURE (%) | PROTEIN (%) | FAT (%) | FIBRE (%) | ASH (%) | CHO (%) | ENERGY VALUE |
|---|---|---|---|---|---|---|---|
| A001 | $9.12^{b}$±0.05 | $15.57^{a}$±0.36 | $4.79^{a}$±0 | $17.20^{b}$±0.07 | $0.50^{a}$±0 | $51.81^{e}$±0.35 | 301.91±20.82 |
| B002 | $8.81^{b}$±0.34 | $21.57^{b}$±0.99 | $6.52^{b}$±0.47 | $20.28^{c}$±0.11 | $1.50^{c}$±0.07 | $41.34^{d}$±0.13 | 310.26± 3.33 |
| C003 | $8.75^{b}$±0.3 | $24.43^{c}$±0.99 | $8.26^{c}$±0.54 | $22.50^{c}$±0.11 | $1.20^{b}$±0.07 | $34.39^{c}$±1.24 | 315.62± 3.76 |
| D004 | $8.56^{b}$±0.13 | $26.06^{d}$±0.59 | $9.24^{c}$±0.06 | $28.28^{a}$±0.25 | $1.79^{d}$±0 | $23.06^{b}$±0.62 | 292.03± 0.66 |
| E005 | $7.53^{a}$±0.50 | $35.54^{e}$±0.61 | $18.59^{d}$±1.26 | $19.50^{a}$±0.64 | $1.20^{b}$±0.01 | $17.67^{a}$±1.74 | 380.15± 1.94 |

Values are means ± SD of duplicate deter
minations. Means within a column bearing the same superscripts are not significantly different ($p>0.05$). **Key**:
A001 = 100% ogi residue;
B002 = 70% Ogi residue + 20%Okara;
C003= 60% Ogi residue + 30%Okara;
D004 = 50%Ogi residue + 40%Okara;
E005=0% Ogi residue + 100% okara;

**CONCLUSION AND RECOMMENDATIONS:** The findings demonstrate that ogi residue and okara, typically regarded as waste, can be successfully transformed into a nutritious and acceptable swallow meal, offering a sustainable, cost-effective strategy for reducing food waste and improving food security. Okara proved the most effective nutritionally in the production of swallow meal, although its sensory impact was less appreciated. Possibly, further research should be carried out on storage and stability to determine the shelf life of the flour.

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**Theme**: Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems and Sectors

**Sub-theme**: Transforming Local Food System for Improved Food Security and Nutrition

**Title**: Proximate, Vitamins and Phytochemical Properties of Freeze-Dried Citrus Fruit Tea Formulated from Blends of Orange, Grapefruit, and Lemon.

**Name of Authors: Ikwumere, C.M., Okafor, A.M., Ezeja, E.P., Enemuo, S. F.**
**Affiliation of Author (s):** Department of Nutrition and Dietetics, University of Nigeria, Nsukka.
**Email:** chinaza.ikwumere@unn.edu.ng **Phone number: 08135859945**
**Keywords: proximate composition, Vitamins, Phytochemical Properties, Freeze-Dried Fruit Tea**

**BACKGROUND AND OBJECTIVES:** Micronutrient deficiencies, particularly inadequate intake of antioxidants and vitamin C, remain a public health concern, especially in developing countries where access to fresh or seasonal fruits is limited by post-harvest losses (1). Fruit tea, also known as herbal or fruit-infused tea, is a beverage made by steeping dried or fresh fruits, herbs, and spices in hot water to extract their flavors, aromas, and nutritional properties (2). Citrus-based fruit teas, made from fruits such as oranges, grapefruit, and lemons, are gaining popularity for their refreshing taste and high content of bioactive compounds, including vitamin C, flavonoids, and phenolic compounds, which are linked to antioxidant, anti-inflammatory, and immune-boosting properties (3). These citrus fruits are perishables that spoil easily especially when kept beyond their shelf life, hence the objective of this study is to preserve the nutrient contents of these citrus blends using freeze drying method.

**MATERIALS AND METHOD:** Fresh fruits were procured from Orba Market, Enugu State, Nigeria, selected for uniform ripeness and absence of defects, washed, peeled, sliced, and freeze-dried at −50 °C under 0.1 mbar for 48 hours. The dried samples were milled into fine powders and stored in airtight containers prior to formulation. Three blends were developed: Sample A (60:30:10), Sample B (50:40:10), and Sample C (40:40:20) of orange, grapefruit, and lemon powders, respectively. The blends were homogenized, packaged into tea bags, and infused in hot water at 80 °C. The proximate, vitamin, mineral, phytochemical contents of the fruit blends were analysed using the methods described by the Association of Official Analytical Chemist (AOAC). Data obtained were analysed using Statistical Product and Services Solution (SPSS) version 22 and presented as means and standard deviations. One-way Analysis of Variance (ANOVA) will be used to compare means while Duncan multiple range test was used to separate means at 5% probability level ($p<0.05$).

**RESULTS AND DISCUSSION:** The results in table 1 shows that the moisture, protein, fat, total carbohydrate, fibre and ash contents of citric tea samples varied significantly across the blends ($p<0.05$)

**Table 1 Proximate composition (%) of citric fruit teabag made from orange, grape fruits and lemon per 100g**

| Sample | Protein | Fat | Fibre | Moisture | Ash | Carbohydrate |
|---|---|---|---|---|---|---|
| **A** | $7.43\pm0.13^{b}$ | $2.42\pm0.16^{a}$ | $17.28\pm0.21^{a}$ | $4.14\pm0.33^{a}$ | $4.04\pm0.10^{a}$ | $64.70\pm0.35^{a}$ |
| **B** | $8.12\pm0.18^{a}$ | $3.07\pm0.06^{b}$ | $18.15\pm0.11^{b}$ | $3.42\pm0.12^{b}$ | $4.21\pm0.06^{a}$ | $62.95\pm0.18^{b}$ |
| **C** | $7.25\pm0.31^{b}$ | $3.09\pm0.06^{b}$ | $18.86\pm0.24^{c}$ | $3.67\pm0.08^{b}$ | $4.11\pm0.29^{a}$ | $63.06\pm0.41^{b}$ |

Values = means ± S.D of duplicate determinations. Means with different superscripts along the columns are significantly ($p<0.05$) different

**Key:**
Sample A: 60% Orange, 30% Grapefruit, 10% Lemon
Sample B: 50% Orange, 40% Grapefruit, 10% Lemon
Sample C: 40% Orange, 40% Grapefruit, 20% Lemon

**Table 2 Vitamin composition of citric fruit teabag made from orange, grape fruits and lemon**

| Sample | Vitamin B6(mg) | Vitaminb9(µg) | Vitamin C(mg) |
|---|---|---|---|
| **A** | $0.04\pm0.02^{a}$ | $0.01\pm0.00^{ab}$ | $21.11 \pm 1.03^{a}$ |
| **B** | $0.08\pm0.03^{b}$ | $0.02\pm 0.01^{a}$ | $22.18 \pm 0.04^{b}$ |
| **C** | $0.06\pm0.01^{ab}$ | $0.010\pm0.00^{b}$ | $23.24 \pm 0.18^{c}$ |

Values = means ± S.D of duplicate determinations. Means with different superscripts along the columns are significantly ($p<0.05$) different

**Key:**
Sample A: 60% Orange, 30% Grapefruit, 10% Lemon
Sample B: 50% Orange, 40% Grapefruit, 10% Lemon
Sample C: 40% Orange, 40% Grapefruit, 20% Lemon

**Table 3Phytochemical composition (mg/100g) of citric fruit teabag made from orange, grape fruits and lemon**

| Sample | Flavonoids | Phenolic acid |
|---|---|---|
| **A** | $576.66 \pm 33.30^{a}$ | $314.45 \pm 15.45^{a}$ |
| **B** | $477.77 \pm 34.56^{b}$ | $395.76 \pm 7.73^{c}$ |
| **C** | $641.48 \pm 28.38^{c}$ | $346.13 \pm 12.76^{b}$ |

Values = means ± S.D of duplicate determinations. Means with different superscripts along the columns are significantly ($p<0.05$) different

**Key:**
Sample A: 60% Orange, 30% Grapefruit, 10% Lemon
Sample B: 50% Orange, 40% Grapefruit, 10% Lemon
Sample C: 40% Orange, 40% Grapefruit, 20% Lemon

The mean score for all values were significantly different ($P<0.05$) except for the ash content of the blends which were relatively the same. The results revealed that vitamins composition of the three samples are relatively the same using freeze drying method except sample C that has the highest vitamin C content ($P<0.05$). However, there were significant differences ($P<0.05$) among phytochemical properties of the fruit tea blends with sample C having the highest flavonoids and sample B has the highest phenolic compounds respectively. The results indicate that all fruit blends can serve as a good micronutrient rich source when freeze dried.

**CONCLUSION AND RECOMMENDATION:** The study demonstrates that it is possible to develop micronutrient-rich citrus fruit teas. Proximate, vitamin and phytochemical analyses revealed that each formulation contributed distinct nutritional benefits. Further studies should be carried out to explore strategies for extending the shelf life of these teabags, particularly in managing microbial growth and maintaining quality under different storage conditions.

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**Theme/sub-theme:** Transforming Local Food System for Improved Food Security and Nutrition

**Title**: Nutritional Composition and Sensory Properties of Biscuits Fortified with Grasshopper (Zonocerus Variegatus) Flour Substitution

**Authors**: *Talabi J.Y.[1] Saliyu S.K.[1], Falade P.A[1], Tobiloba T.D.[1,2], Ajayi K.[1]

**Authors Affiliation**: [1]Department of Human Nutrition and Dietetics, Afe Babalola University, Olusegun Obasanjo Way, Ado-Ekiti 360102, Ekiti State, Nigeria.

[2]Department of Food Science and Technology, Bamidele Olumilua University of Education, Science and Technology Ikere-Ekiti.

**Corresponding author:** talabij@abuad.edu.ng, +2348032199942

**Keywords:** Edible insects, grasshopper flour, fortified biscuits and food security

**Highlights**

- Grasshopper flour significantly improved the nutritional quality of wheat biscuits.
- Biscuits fortified with 15% grasshopper flour showed the highest protein, fibre, vitamins, and minerals.
- No toxic heavy metals were detected, and anti-nutritional factors remained negligible.
- Grasshopper-fortified biscuits achieved acceptable sensory ratings despite partial wheat substitution.

**Background and Objective:** The increasing prevalence of food insecurity, protein-energy malnutrition, and the demand for sustainable food systems have stimulated interest in alternative protein sources such as edible insects [1]. Zonocerus variegatus (grasshopper) is an underutilized edible insect with high nutritional potential. This study evaluated the nutritional composition, safety, and sensory acceptability of biscuits produced from wheat flour partially substituted with grasshopper flour.

**Methodology:** A laboratory-based experimental study was conducted using four biscuit formulations. The first sample contained 100% wheat flour (control sample), second sample contained 95% wheat and 5% grasshopper flour blend, Third sample contained 90% wheat and 10% grasshopper flour blend while fourth sample contained 85% wheat and 15% grasshopper flour blend. The biscuits were analyzed for proximate composition using standard AOAC methods, while amino acid profile, vitamin content, mineral composition, and anti-nutritional factors were determined using High-Performance Liquid Chromatography (HPLC) and Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). Sensory evaluation was carried out by 50 untrained panelists using a 9-point hedonic scale. Data were analyzed using one-way analysis of variance (ANOVA), with significance established at $p < 0.05$.

**Results and Discussion:** Incorporation of grasshopper flour significantly ($p < 0.05$) influenced the nutritional and sensory properties of the biscuits. The 15% grasshopper flour formulation (WGF4) exhibited the highest protein (3.87%), crude fiber (5.22%), carbohydrate (35.15%), vitamin A (0.52 mg/L), vitamin B9 (3.76 mg/L), vitamin D (1.60 mg/L), vitamin E (0.60 mg/L), iron (1.99 mg/kg), and zinc (0.56 mg/kg) contents. Essential amino acids, including histidine, valine, tryptophan, methionine, leucine, and lysine, were present across the fortified samples, indicating improved protein quality. Toxic heavy metals (cadmium, lead, mercury, arsenic, and nickel) were not detected, while anti-nutritional factors remained negligible, suggesting product safety. Although the control sample recorded the highest sensory scores, biscuits containing 5–15% grasshopper flour achieved acceptable ratings for colour, aroma, taste, texture, crispiness, and overall acceptability. These findings demonstrate that grasshopper flour can substantially enhance the nutritional quality of biscuits without compromising consumer acceptance. These findings suggest that partial replacement of wheat flour with grasshopper flour enhanced the nutritional density of the biscuits, particularly by improving

protein, dietary fibre, and micronutrient contents, which may contribute to addressing protein-energy malnutrition and micronutrient deficiencies in vulnerable populations [2].

**Proximate composition of biscuit developed from wheat-grasshopper flour blend**

| Sample | Moisture (%) | Protein (%) | Fat (%) | Fiber (%) | Ash (%) | Carbohydrate (%) |
|---|---|---|---|---|---|---|
| WGF1 | $29.41\pm0.02^{d}$ | $3.56\pm0.02^{c}$ | $33.50\pm0.02^{b}$ | $2.24\pm0.01^{c}$ | $3.48\pm0.01^{b}$ | $27.81\pm0.02^{c}$ |
| WGF2 | $30.34\pm0.07^{c}$ | $3.08\pm0.01^{d}$ | $25.63\pm0.03^{c}$ | $4.97\pm0.01^{a}$ | $3.49\pm0.04^{b}$ | $32.49\pm0.08^{b}$ |
| WGF3 | $31.16\pm0.01^{a}$ | $3.75\pm0.03^{b}$ | $35.05\pm0.29^{a}$ | $4.21\pm0.01^{b}$ | $3.60\pm0.02^{a}$ | $22.23\pm0.30^{d}$ |
| WGF4 | $30.60\pm0.01^{b}$ | $3.87\pm0.01^{a}$ | $22.40\pm0.05^{d}$ | $5.22\pm0.15^{a}$ | $2.76\pm0.01^{c}$ | $35.15\pm0.13^{a}$ |

Data are mean values of triplicate determination ± standard error of mean; Mean values carrying the same letter along columns are not significantly different ($p>0.5$)
Sample WGF1 is biscuit obtained from 100% wheat flour
Sample WGF2 is obtained from 95% wheat flour and 5% grasshopper flour
Sample WGF3 is obtained from 90% wheat flour and 10% grasshopper flour
Sample WGF4 is obtained from 85% wheat flour and 15% grasshopper flour.

**Conclusion and Recommendation:** Partial substitution of wheat flour with up to 15% grasshopper flour produced nutritionally enriched and microbiologically safe biscuits with satisfactory sensory properties. The incorporation of grasshopper flour offers a sustainable strategy for improving dietary protein and micronutrient intake while supporting food security. It is recommended that grasshopper flour be promoted as a functional ingredient in bakery products, and further studies should investigate product shelf life, consumer acceptance across different populations, and large-scale commercial production.

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**FUNCTIONAL PROPERTIES OF COMPLEMENTARY FOOD DEVELOPED FROM MALTED MILLET, SWEET POTATO, BREADFRUIT, AND SOYBEAN FLOUR BLENDS.**

**SUBTHEME: Transforming Local Food Systems for Improved Food Security and Nutrition**

Bello, Monsurat

Adeyemi Federal University of Education, Ondo, Ondo State, Nigeria.

Email: bellomonsurat01@gmail.com; 08060228181

**KEYWORDS:** Complementary diet, Functional properties, Food security**,** Malnutrition,

**Highlights:** This study developed affordable, nutrient-dense complementary food from locally available malted millet, sweet potato, breadfruit, and soybean flour blends with better functional properties.

**Background to the Study**

Functional properties are the physicochemical characteristics such as bulk density, water absorption capacity, least gelation, among others for ease of preparation, and suitability for meeting the nutritional needs of infants considering their immature digestive system. Malnutrition in Nigerian infants and young children remains a significant public health concern, with 37% stunted and 18% underweight (1). Complementary feeding is a critical period in a child's life, and the quality and functional properties of the diet can have a lasting impact on their health and development (2), the development of complementary foods in Nigeria requires careful consideration. Water and oil absorption capacities can affect the energy density and texture of the complementary food, while least gelation influences its consistency and palatability (3). This study aims to evaluate the functional properties of the developed complementary food.

**OBJECTIVES**

This study determined the functional properties of a complementary blends formulated from blends of malted millet, sweet potato, breadfruit, and soybean flours.

**MATERIALS AND METHODS**

**MATERIALS:** Fresh samples of whole millet grains, sweet potatoes, breadfruits, and soybeans were purchased from a central market in Ondo town, Ondo State, Nigeria.

**Blended Formulation**

Five (5) blends of the complementary diets were produced by mixing the flours using the blend ratio-adjusted procedure of (4). The malted millet, the production of breadfruit flour, soybean flour and sweet potato flour was carried out using the methods of (5), (6), (7) and (8) respectively with modifications. The blend ratios were A (Malted Millet flour 50%, Breadfruit flour 20%, Soybeans flour 20%, and Sweet Potato flour 10%); B (Malted Millet flour 40%, Breadfruit flour 30%, Soybeans flour 20%, and Sweet Potato flour 10%); C (Malted Millet flour 30%, Breadfruit flour 40%, Soybeans flour 20%, and Sweet Potato flour 10%); D ( Malted Millet flour 20%, Breadfruit flour 50%, soybeans flour 20%, and Sweet Potato flour 10%); and E (Ordinary Millet flour 100% (control). The samples were analysed as follows: bulk density (9); water absorption capacity, Oil absorption capacity (OAC), and least gelation concentration (3); swelling capacity was determined by the method described in (10).

## RRESULTS AND DISCUSSION

Functional properties of a complementary food can affect nutrient delivery, absorption, overall energy intake, impact texture and acceptability by infants (11, 12). Bulk density of the formulated foods (0.51-0.55g/ml) were higher than the reported values of (3). This maybe as a result of the difference in the formulation constituents. The values obtained were however within the recommended value (≤ 0.7g/ml) dry flour, thus indicating suitability as complementary food for infants.

**Table 1: Functional properties of Complementary Food Formulations**

| Samples | Loose Bulk density (g/ml) | Pack Bulk density (g/ml) | Swelling Capacity (g/g) | Oil Abs Capacity (g/100g) | Water Abs Capacity (g/100g) | Least gelation (%) |
|---|---|---|---|---|---|---|
| **A** | 0.51±0.02$^{b}$ | 0.53±0.00$^{b}$ | 16.73±0.51$^{b}$ | 95.77±0.35$^{b}$ | 128.50±1.58$^{a}$ | 15.72±0.68$^{d}$ |
| **B** | 0.51±0.01$^{b}$ | 0.53±0.00$^{b}$ | 17.35±0.05$^{a}$ | 97.70±0.00$^{a}$ | 127.60±0.75$^{b}$ | 16.85±0.01$^{a}$ |
| **C** | 0.52±0.00$^{a}$ | 0.52±0.00$^{c}$ | 16.05±0.27$^{c}$ | 93.20±0.22$^{c}$ | 123.75±0.05$^{c}$ | 14.75±0.10$^{c}$ |
| **D** | 0.52±0.00$^{a}$ | 0.52±0.00$^{c}$ | 15.42±0.20$^{d}$ | 91.35±0.31$^{d}$ | 121.35±0.05$^{d}$ | 14.29±0.01$^{c}$ |
| **E** | 0.52±0.00$^{a}$ | 0.55±0.00$^{a}$ | 14.83±0.01$^{e}$ | 87.60±0.64$^{e}$ | 119.60±1.42$^{e}$ | 13.27±0.50$^{e}$ |

Mean ± standard deviation of triplicate determinations, means values with different superscript in a row are significantly different (P≤0.05).

**Keys:- A- Malted Millet flour 50% + Breadfruit flour 20% + Soybeans flour 20% + Sweet Potato flour 10%, B- Malted Millet flour 40% + Breadfruit flour 30% + Soybeans flour 20% + Sweet Potato flour 10%, C- Malted Millet flour 30% + Breadfruit flour 40% + Soybeans flour 20% + Sweet Potato flour 10%, D- Malted Millet flour 20% + Breadfruit flour 50% + Soybeans flour 20% + Sweet Potato flour 10%, E- Ordinary Millet flour 100%(control).**

## CONCLUSION AND RECOMMENDATION

The result of the bulk density, swelling capacity, oil absorption capacity among others are indication of successfully formulated complementary food blends exhibiting improved functional properties. This shows that the formulated blends can be scaled up for commercial production targeting infants (6-24 months).

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**Theme/sub-theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems & Sectors (Sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition).

**Title:** Evaluation of the Proximate, Glycemic Index and Vitamin Composition of Cookies made with Composite Flour of Wheat, Orange-fleshed Sweet Potato, Oyster Mushroom and Avocado Pear Seed.

**Name of Author(s):** *Odu-Justine, M.[1] and Mgbeje, B. A.[2]

**Affiliation of Author(s):** [1]Department of Biochemistry, University of Calabar, Cross River State, Nigeria. [2]Department of Biochemistry, University of Calabar, Cross River State, Nigeria.

***Corresponding author, e-mail:** mercyoduj@gmail.com, +2348037222937.

**Keywords:** Composite flour, Glycemic index, Beta-carotene, Wheat substitution.

**Highlights**

- Composite flour is a locally sourced strategy to enhance food security amid global wheat supply constraints [1].
- W.O.A (wheat + orange-fleshed sweet potato + avocado seed) cookies had significantly higher crude protein, beta-carotene and vitamin D than wheat flour (WF).

## BACKGROUND AND OBJECTIVES

Wheat flour, though widely used in cookie production, lacks some essential nutrients and contains gluten, and global wheat supply has been strained by the Russia-Ukraine conflict. This study evaluated the proximate, glycemic index and vitamin composition of cookies from composite flour blends of wheat (W), orange-fleshed sweet potato (O), oyster mushroom (M) and avocado pear seed (A), as potential alternatives to wheat flour cookies.

## MATERIALS AND METHODS

Orange-fleshed sweet potato tubers were sourced from Asa-Uwe Okorowo Ekeye farm, Port Harcourt; avocado pears from Marian market, Calabar; oyster mushrooms from an organic farm in Akpabuyo; and wheat grains from Watt market, Calabar, then authenticated at the Department of Botany, University of Calabar. Composite flours were formulated as wheat + orange-fleshed sweet potato + avocado seed (W.O.A, 50:40:10%), wheat + mushroom + avocado seed (W.M.A, 50:40:10%), wheat + orange-fleshed sweet potato + mushroom (W.O.M, 40:30:30%), orange-fleshed sweet potato + mushroom + avocado seed (O.M.A, 40:40:20%), and 100% wheat flour (WF) as control. Proximate, glycemic index and vitamin analyses followed standard AOAC (2010) methods.

## RESULTS AND DISCUSSION

Proximate, glycemic index and vitamin composition of the cookies is presented in Table 1. Moisture content was significantly higher ($P<0.05$) in all composite cookies than in WF, with W.O.M highest (23.46%) and W.O.A lowest (19.41%) among composites. WF recorded higher carbohydrate, crude fibre and energy values than the composites. Crude protein and glycemic index were significantly higher in W.O.A (1.61% and 60.46%, respectively) relative to WF (1.55% and 32.77%), while ash was highest in W.M.A (1.61%) and fat highest in O.M.A (9.48%). Beta-carotene was significantly higher ($P<0.05$) in W.O.A (3.47 µg/100g) than in WF (2.95 µg/100g), consistent with the orange-fleshed sweet potato content of this blend, while WF retained higher vitamin B1 and B2 levels than the composites. Vitamin B3 and vitamin C were highest in W.M.A, and vitamin D was highest in W.O.A, whereas vitamins E and K were highest in W.O.M relative to WF. Except for W.O.A, glycemic index of the composite cookies remained within a range unlikely to raise blood glucose on consumption.

**Table 1: Proximate, Glycemic Index and Vitamin Composition of Cookies**

| arameter | WF | W.O.A | W.M.A | W.O.M | O.M.A |
|---|---|---|---|---|---|
| loisture (%) | 16.78 ± 0.04 | 19.41 ± 0.01 | 21.66 ± 0.08 | 23.46 ± 0.01 | 20.66 ± 0.06 |
| rude protein (%) | 1.55 ± 0.01 | 1.61 ± 0.01 | 1.49 ± 0.01 | 1.38 ± 0.02 | 1.45 ± 0.00 |
| lycemic index (%) | 32.77 ± 0.04 | 60.46 ± 0.06 | 54.66 ± 0.08 | 56.39 ± 0.13 | 57.44 ± 0.06 |
| eta-carotene (µg/100g) | 2.95 ± 0.01 | 3.47 ± 0.01 | 2.67 ± 0.02 | 2.71 ± 0.01 | 2.87 ± 0.04 |
| itamin C (mg/100g) | 2.88 ± 0.03 | 3.91 ± 0.01 | 4.81 ± 0.01 | 3.60 ± 0.06 | 2.64 ± 0.06 |
| itamin D (µg/100g) | 0.076 ± 0.00 | 0.082 ± 0.00 | 0.060 ± 0.00 | 0.072 ± 0.00 | 0.067 ± 0.00 |

WF = Wheat flour (control); W.O.A = Wheat + Orange-fleshed sweet potato + Avocado seed flour; W.M.A = Wheat + Mushroom + Avocado seed flour; W.O.M = Wheat + Orange-fleshed sweet potato + Mushroom flour; O.M.A = Orange-fleshed sweet potato + Mushroom + Avocado seed flour. Values are means ± SD.

## CONCLUSION AND RECOMMENDATION(S)

Composite flours of wheat, orange-fleshed sweet potato, oyster mushroom and avocado pear seed produced cookies with nutrient profiles comparable, and in some parameters superior, to wheat flour cookies, and could serve as viable alternatives to reduce dependence on wheat. Further work on sensory acceptabilityis recommended.

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**Sub-Theme Transforming Local Food Systems for Improved Food Security and Nutrition**

# SUSTAINABLE DIET IN A STRUGGLING ECONOMY: EXPLORING THE INTERPLAY BETWEEN FOOD SECURITY, NUTRITION, AND ENVIRONMENTAL SUSTAINABILITY IN NIGERIA

: Name of Author(s): Babaranti, T.A.[1] and Ogunba, B.O.[2]

Affiliation of Authors:

[1]Lagos State Public Service Staff Development Centre

[2]Department of Human Nutrition and Dietetics, Obafemi Awolowo University, Ile-Ife

Corresponding author: *Babaranti, T.A., e-mail: titilayomibabaranti@gmail.com

Keywords: Sustainable diet, food security, nutrition, environmental sustainability.

Highlights:

- High willingness to adopt sustainable diets despite economic constraints.
- No significant relationship between dietary habits and sustainability awareness.
- Economic incentives and nutrition education are crucial for promoting sustainable diets.

**Background and Objectives**

Sustainable nutrition is crucial for addressing food insecurity, health disparities, and environmental degradation in developing countries like Nigeria [1, 3]. Despite global efforts, food insecurity persists, affecting millions of people worldwide, particularly in Africa and Nigeria [1, 4]. Limited understanding of factors influencing sustainable nutrition practices in Nigeria, particularly in the context of economic constraints and cultural norms, hinders progress [2].

This study examined the intersections of food security, nutrition, and environmental sustainability in Nigeria's economic context, building on existing research. Content validity was ensured through expert review. Informed consent, confidentiality, and anonymity were ensured

**Materials and Method:** This study used a cross-sectional survey design, collecting data from 346 public servants in Lagos via online questionnaire, specifically Google form. Data analysis involved descriptive statistics such as frequencies and percentages and inferential statistics such as regression and ANOVA, Chi square. SPSS version 20 was used for the analysis. The study accepted significance at the $P < 0.05$ level.

**Result and Discussion**

Notably, 69.4% of respondents had previously made dietary changes for sustainability, and 98.8% expressed willingness to make further changes to support sustainability. The results showed no significant relationship between current dietary habits and sustainability awareness ($\chi^2 = 5.650$, $p = 0.227$), income level and willingness to adopt sustainable diets ($\chi^2 = 6.480$, $p = 0.166$), and education level and dietary habits ($\chi^2 = 0.846$, $p = 0.497$).

**Table 1: Sustainability awareness and dietary habit of respondents**

| Sustainability awareness and dietary habits | | Sustainability awareness level | | | |
|---|---|---|---|---|---|
| | | Low | Moderate | High | Total |
| Dietary habit variable | Not Frequent | 0 | 4 | 4 | 8 |
| | Moderately frequent | 0 | 2 | 4 | 6 |
| | Very frequent | 2 | 0 | 40 | 02 |
| Total | | 2 | 6 | 38 | 46 |

$X^2 = 5.650$, df = 4, p-value = 0.227, Remark: p > 0.05

**Table 2: Sustainable diets and income level of respondents**

| Sustainable diets and income level | | Willingness to change. | | |
|---|---|---|---|---|
| | | No | Yes | Total |
| Income | < ₦50,000 | 0 | 2 | 2 |
| | ₦50,000-₦100,00 | 0 | 4 | 4 |
| | ₦100,000 - ₦200,000 | 0 | 04 | 04 |
| | ₦200,000 - ₦500,000 | 1 | 18 | 20 |
| | > ₦500,000 | 1 | 4 | 6 |
| Total | | 1 | 42 | 46 |

$X^2 = 6.480$, df = 4, p-value = 0.166, Remark: p > .05

**Conclusion**

The study reveals a positive disposition towards sustainability principles among respondents, with a willingness to adopt sustainable diets and pay more for sustainable options.

**Recommendations**

Promoting sustainable diets in Nigeria requires increased nutrition education, economic incentives for sustainable food options, and support for local produce. Targeted awareness campaigns and policy initiatives can make sustainable diets more accessible and affordable, fostering a healthier food system for all Nigerians.

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**Sub-theme:** Transforming local food systems for improved security and nutrition

**Title:** Incorporation of hibiscus leaf extract in food products: nutritional value, sensory attributes, and consumer acceptance

***Onuabuchi, I. C[1]. and Okwara Jacintha[1]**

**[1]Department of Hospitality Management Technology, Ogbonnaya Onu Polytechnic, Aba, Abia State, Nigeria.**

***Corresponding author email:** ifeoma.onuabuchi@abiastatepolytechnic.edu.ng

**Keywords:** Hibiscus sabdariffa leaf extract, nutritional value, consumer acceptance

**Highlights**

- Rich nutritional and functional properties
- Improvement of food quality
- Positive consumer acceptance and market potential

**BACKGROUND:** The hospitality industry is increasingly influenced by health and wellness trends, driving demand for foods that are both nutritious and appealing. *Hibiscus sabdariffa* (zobo) is a plant known for its rich nutritional and bioactive composition, including proteins, minerals, antioxidant and phytochemicals such as flavonoids and phenols [2; 1]. While it has been widely used in beverages and traditional medicine, its application in food fortification especially in solid foods like cake and jollof rice remains underexplored. Additionally, there is limited information on how its incorporation affects both nutritional quality and sensory acceptability.

**OBJECTIVE:** This study addresses this gap by evaluating hibiscus leaf extract as a functional ingredient in cake and jollof rice produced. The proximate composition, sensory attributes and consumer acceptability and preferences were determined.

**MATERIALS AND METHOD:** Hibiscus calyces and other ingredients were sourced locally from Umungasi market, Aba, Abia State. Hibiscus extract (zobo) was prepared by washing, boiling, filtering and cooling the calyces. Jollof rice and cake were prepared using standard recipes. Samples were prepared at three substitution levels: 0% (control), 20%, and 30% hibiscus leaf extract. The proximate composition of the produced samples was analysed. Sensory evaluation was conducted with 35 untrained panelists using a 9-point hedonic scale. Data from the study were statistically analyzed using ANOVA (SPSS version 22), significance was set at $p<0.05$.

**RESULTS AND DISCUSSION:**

**PROXIMATE COMPOSITION OF FOOD PRODUCTS INCORPORATING HIBISCUS LEAF EXTRACT**

**Table 1: Proximate composition of the cake and jollof samples**

| amples | Moisture (%) | Protein (%) | Fat (%) | Fibre (%) | Ash (%) | CHO (%) | Energy (Kcal) |
|---|---|---|---|---|---|---|---|
| CCO | 3.85$^{c}$±0.03 | 2.78$^{b}$±0.02 | 4.23$^{a}$±0.01 | .32$^{a}$±0.03 | .87$^{c}$±0.03 | 7.96$^{a}$±0.02 | 70.99$^{a}$±0.04 |
| CZ1 | 4.21$^{b}$±0.04 | 2.83$^{b}$±0.01 | 4.18$^{ab}$±0.03 | .26$^{ab}$±0.04 | .12$^{b}$±0.03 | 7.46$^{b}$±0.02 | 68.76$^{b}$±0.28 |
| CZ2 | 4.38$^{a}$±0.04 | 2.95$^{a}$±0.03 | 4.13$^{b}$±0.02 | .16$^{b}$±0.04 | .39$^{a}$±0.04 | 7.01$^{c}$±0.04 | 66.95$^{c}$±0.06 |
| JRC0 | 8.72$^{c}$±0.05 | 0.75$^{c}$±0.03 | 2.97$^{a}$±0.01 | .66$^{b}$±0.03 | .92$^{c}$±0.00 | 5.97$^{a}$±0.04 | 03.64$^{a}$±0.06 |
| JRZ1 | 8.93$^{b}$±0.04 | 0.91$^{b}$±0.01 | 2.77$^{b}$±0.02 | .55$^{c}$±0.02 | .19$^{b}$±0.01 | 5.36$^{a}$±0.38 | 01.17$^{b}$±0.30 |
| JRZ2 | 9.30$^{a}$±0.04 | 1.13$^{a}$±0.02 | 2.61$^{c}$±0.03 | .47$^{a}$±0.03 | .40$^{a}$±0.04 | 4.16$^{b}$±0.06 | 94.61$^{c}$±0.59 |

**Values are means ± standard deviations of duplicate samples. $^{a-c}$ Means with the same superscripts down the columns are not significantly different (P>0.05). $^{a-c}$ Means with different superscripts down the columns are significantly different (P<0.05).**

**Key: CCO: 100% Wheat cake**

**CZ1: 80:20 wheat: zobo leaf extract cake**

**CZ2: 70:30 wheat: zobo leaf extract cake**

**JRC0: 100% Jollof Rice**

**JRZ1: 80:20 Jollof Rice: Zobo leaf extract**

**JRZ2: 70:30 Jollof Rice: Zobo leaf extract**

Hibiscus leaf extract significantly improved the nutritional quality of the products by increasing protein and ash contents, particularly at 30% inclusion (CZ2 and JRZ2). Fat, carbohydrate, and energy values decreased slightly with increasing substitution levels.

**SENSORY CHARACTERISTICS AND GENERAL ACCEPTABILITY OF FOOD PRODUCTS INCORPORATING HIBISCUS LEAF EXTRACT**

**Table 2 Sensory characteristics and general acceptability of the cake and jollof samples**

| Samples | Appearance | Aroma | Taste | Texture | General Acceptability |
|---|---|---|---|---|---|
| **CCO** | 7.57[a]±1.44 | 7.29[a]±2.01 | 7.43[a]±1.77 | 7.34[a]±1.43 | 7.41[a]±1.36 |
| **CZ1** | 7.80[a]±1.88 | 7.51[a]±2.06 | 7.83[a]±1.58 | 7.97[a]±1.77 | 7.78[a]±1.38 |
| **CZ2** | 7.83[a]±1.72 | 6.91[a]±2.63 | 7.03[a]±2.61 | 7.06[a]±2.52 | 7.21[a]±2.06 |
| **JRC0** | 7.94[a]±1.78 | 7.66[a]±1.35 | 7.57[a]±1.93 | 7.31[a]±1.60 | 7.62[a]±1.22 |
| **JRZ1** | 7.34[a]±1.85 | 7.51[a]±1.99 | 6.97[a]±2.20 | 7.14[a]±2.00 | 7.24[a]±1.68 |
| **JRZ2** | 7.69[a]±1.55 | 7.91[a]±1.52 | 7.60[a]±1.56 | 7.57[a]±1.60 | 7.69[a]±1.11 |

**Values are means ± standard deviations of duplicate samples. [a-c] Means with the same superscripts down the columns are not significantly different (P>0.05). [a-c] Means with different superscripts down the columns are significantly different (P<0.05).**:

**Key: CCO**: 100% Wheat cake

**CZ1**: 80:20 wheat cake: zobo leaf extract

**CZ2**: 70:30 wheat cake: zobo leaf extract

**JRC0: 100% Jollof Rice**

**JRZ1: 80:20 Jollof Rice: Zobo leaf extract**

**JRZ2: 70:30 Jollof Rice: Zobo leaf extract**

The sensory evaluation showed no significant differences (p>0.05) among the samples, indicating that hibiscus leaf extract did not adversely affect consumer acceptability. Samples CZ1 and JRZ2 recorded comparatively higher sensory scores.

**CONCLUSION:** Hibiscus extract increased the nutritional value p<0.05 (best at 30%) without affecting acceptability of the foods.

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**Theme/sub-theme:** Transforming Local Food System for Improved Food Security and Nutrition

**Title**: Texture Quality and Shelf Life Study of Gluten Free Bread Produced From Plantain and Coconut Flour

**Authors**: *Ayeni K.O., Tobiloba T.D., and, Ojo O.V.

**Authors Affiliation**: Department of Food Science and Technology, Bamidele Olumilua University of Education, Science and Technology Ikere-Ekiti.

**Corresponding author:** ayeni.kehinde@bouesti.edu.ng, +23480650806015

**Keywords:** Plantain flour, coconut flour, composite bread, proximate composition

**Highlights**

1. Composite bread from plantain and coconut flour improved fibre, ash, and overall nutrient composition
2. Mineral and vitamin contents were significantly enhanced, especially potassium, phosphorus, and vitamin A
3. Partial substitution of wheat flour affected loaf quality and sensory acceptability but remained moderately acceptable

**Background and Objective**: Bread is a widely consumed staple food that provides a major source of dietary energy globally. However, increasing concerns over wheat dependency, gluten-related disorders, and food security have driven interest in the use of composite flours derived from locally available crops [1]. This study evaluated the nutritional, physical, sensory, and storage qualities of bread produced from blends of plantain (*Musa paradisiaca*) and coconut (*Cocos nucifera*) flours as alternatives to wheat bread.

**Materials and Methods**: Unripe plantain and coconut flours were produced through standardized processing methods involving washing, peeling, slicing, blanching, oven drying (60°C), milling, and sieving. Bread was formulated using a Completely Randomized Design (CRD) comprising a control (100% wheat flour) and four composite blends of wheat, plantain, and coconut flours in varying proportions. Each formulation was prepared in triplicate using standard baking procedures involving mixing, kneading, fermentation, proofing, baking at 180–200°C, and cooling prior to analysis. Proximate composition, mineral and vitamin contents were determined using AOAC standard methods, while physical properties, colour parameters, and sensory attributes were evaluated using standard instrumental and hedonic scaling techniques. Shelf-life stability was assessed by monitoring physicochemical changes during storage at ambient temperature over seven days. Data were analyzed using one-way ANOVA at $p < 0.05$.

**Results and Discussion:** Results showed significant differences ($p < 0.05$) among samples. Moisture content ranged from 14.28–43.99%, ash (1.95–6.11%), protein (2.46–7.34%), fat (16.82–30.31%), fibre (3.14–7.42%), and carbohydrate (22.74–53.85%). Mineral content varied significantly, with potassium ranging from 2.92–3.93 mg/100 g and phosphorus from 17.17–38.26 mg/100 g. Vitamin A ranged from 113.28–331.89 µg RAE, while vitamin C ranged from 0.739–0.820 mg/g. Physical properties also differed significantly, with loaf weight ranging from 60.13–725.86 g and volume from 112.00–420.37 $cm^3$ ($p < 0.001$). Sensory scores indicated moderate acceptability, with overall acceptability ranging from 5.87–7.13 on a 9-point hedonic scale ($p < 0.001$). Colour analysis showed significant variation in lightness (L* 65.00–84.00) and chroma values ($p < 0.001$). Shelf-life observations indicated gradual quality changes during storage, influenced by formulation differences. The significant differences in proximate composition show that replacing wheat flour with plantain and coconut flours improved the nutritional quality of the bread, especially in fibre, fat, and ash contents. This agrees with [2], who reported that composite flours enhance the nutritional profile of baked products. The developed bread may support better dietary fibre intake and improved nutritional value compared to conventional wheat bread. Mineral and

vitamin contents varied significantly among samples, with notable levels of potassium, phosphorus, and vitamin A. This supports findings by [3] that plant-based flour blends improve micronutrient content in bakery products. The bread could help contribute to reducing micronutrient deficiencies in diets.

**Conclusion and Recommendation**

The study concludes that substituting wheat flour with plantain and coconut flours enhances the nutritional quality of bread, particularly its fibre, fat, ash, vitamin, and mineral contents, but may reduce loaf quality and sensory acceptability at higher levels. Shelf-life is also affected by formulation and moisture content. It is recommended that optimal substitution levels be established, alongside improved packaging, storage, and larger consumer studies to support product stability, acceptability, and commercialization.

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**Sub-Theme:** Transforming local food system for improved food and security and Nutrition

**Title:** Nutritional Composition and Sensory Evaluation of Plant-based Milk Powder produced from Soybean (*Glycine max*), Tigernut (*Cyperus esculentus*), and Date Palm Fruits (*Phoenix dactylifera*)

**Authors:*** Obi, G.C.[1], Asomugha, I.C.[2]

**Affiliation**: Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State.

**Corresponding Email**: *obichidimmagloria@gmail.com, +2348131897021

**Keywords**: Soybean, Tigernut, Date Palm Fruit, Plant-based Milk Powder

**Highlights**

- Sample blend made of 65% soybean, 25% tigernut, and 10% date (STDB2) was the most accepted, while 100% soybean powder (SBP) was the least accepted.

- Sample 3 (60% soybean, 30% tigernut, 10% date) was highly nutrient-dense in micronutrients with moderate macronutrient content.

**Background:** Plant-based milk alternatives are powdered milk products derived from plant sources like soybean. In Nigeria, the current economic challenges have negatively affected food affordability and accessibility, especially for essential commodities such as dairy milk. This situation has contributed to increased rates of malnutrition like stunting, wasting, and underweight among children and infants thereby compromising overall health outcomes (1).

**Objectives:** To determine the nutritional composition and sensory evaluation of plant-based milk powder produced from soybean, tigernut, and date palm fruits.

**Materials and Method**: The study adopted an experimental design. Materials were purchased from Oriegba market in Umuahia, Abia State, Nigeria. They were processed and grinded into powder. Four samples were coded: SBP (100% soybean powder as control), STDB1 (70% soybean, 20% tigernut, 10% date), STDB2 (65% soybean, 25% tigernut, 10% date) and STDB3 (60% soybean, 30% tigernut, 10% date). IBM SPSS version 21 was used for data analysis; variance and Duncan Multiple Range Test were applied ($p < 0.05$).

**Results and Discussion:** Results showed the SBP to have lower moisture, ash, dry matter; highest in crude protein, crude fibre and fat while formulated blends 3 had higher energy value. STDB 3 had the highest provitamin A and vitamin C, while STDB 2 had the highest vitamin D, B1 and B2. STDB 3 had highest amount of calcium, potassium, iron, zinc and iodine while STDB 2 had higher sodium and STDB 1contained higher phosphorus content. STDB 2 was the most accepted followed by STDB 3. Below are tabular representations of all the samples assessed.

**Table 1: Proximate Composition of Formulated Sample Blends**

| Samples | Moisture (%) | Dry Matter (%) | Ash Content (%) | Crude Protein (%) | Dietary Fiber (%) | Fat (%) | Carbohydrate (%) | Energy Value (kcal) |
|---|---|---|---|---|---|---|---|---|
| STB1 | $10.27^{b} \pm 0.04$ | $89.73^{b} \pm 0.04$ | $2.87^{b} \pm 0.04$ | $21.76^{b} \pm 0.06$ | $3.84^{b} \pm 0.00$ | $25.66^{b} \pm 0.08$ | $35.57^{c} \pm 0.27$ | $459.82^{a} \pm 0.54$ |
| SBP | $9.88^{c} \pm 0.03$ | $90.12^{a} \pm 0.03$ | $3.77^{a} \pm 0.02$ | $25.67^{a} \pm 0.10$ | $4.29^{a} \pm 0.01$ | $29.51^{a} \pm 0.13$ | $26.90^{d} \pm 0.29$ | $437.82^{a} \pm 53.34$ |
| STDB2 | $10.17^{b} \pm 0.01$ | $89.83^{b} \pm 0.01$ | $2.86^{b} \pm 0.06$ | $20.64^{c} \pm 0.01$ | $3.79^{c} \pm 0.01$ | $23.41^{c} \pm 0.01$ | $39.12^{b} \pm 0.07$ | $449.72^{a} \pm 0.48$ |
| STDB3 | $10.51^{a} \pm 0.16$ | $89.49^{c} \pm 0.16$ | $2.81^{b} \pm .021$ | $19.81^{c} \pm 0.01$ | $3.81^{c} \pm 0.01$ | $22.78^{d} \pm 0.03$ | $41.46^{a} \pm 1.84$ | $450.10^{a} \pm 7.04$ |

**Table 2: Vitamin composition of formulated blends**

| Samples | Pro vitamin A (ug/100g) | Vitamin D (ug/100g) | Vitamin C (mg/100g) | Vitamin B1 (mg/100g) | Vitamin B2 (mg/100g) |
|---|---|---|---|---|---|
| STDB1 | $8.69^{b} \pm 0.01$ | $1.73^{a} \pm 0.01$ | $4.83^{d} \pm 0.02$ | $0.45^{b} \pm 0.00$ | $0.37^{b} \pm 0.01$ |
| SBP | $8.44^{b} \pm 0.02$ | $1.87^{a} \pm 0.03$ | $6.37^{c} \pm 0.04$ | $0.64^{b} \pm 0.01$ | $0.46^{a} \pm 0.01$ |
| STDB2 | $7.92^{b} \pm 0.09$ | $1.95^{a} \pm 0.01$ | $7.81^{b} \pm 0.01$ | $0.77^{a} \pm 0.01$ | $0.58^{a} \pm 0.02$ |
| STDB3 | $12.40^{a} \pm 0.05$ | $0.06^{b} \pm 0.00$ | $9.43^{a} \pm 0.04$ | $0.27^{c} \pm 0.02$ | $0.19^{c} \pm 0.01$ |

**Values are mean ± standard deviation of samples. $^{a-d}$ Means with similar superscripts within the same column are not significantly different (p>0.05)**

**Table 3: Mineral composition of formulated blends**

| Samples | Sodium (mg/100g) | Calcium (mg/100g) | Potassium (mg/100g) | Phosphorous (mg/100g) | Iron (mg/100g) | Zinc (mg/100g) | Iodine (ug/100g) |
|---|---|---|---|---|---|---|---|
| STB1 | $48.76^{b} \pm 0.06$ | $348.46^{b} \pm 0.06$ | $452.81^{b} \pm 0.01$ | $283.76^{a} \pm 0.06$ | $4.62^{b} \pm 0.021$ | $2.61^{b} \pm 0.01$ | $85.77^{b} \pm 0.04$ |
| SBP | $43.55^{d} \pm 0.07$ | $326.77^{c} \pm 0.04$ | $446.75^{c} \pm 0.07$ | $278.49^{b} \pm 0.01$ | $4.74^{b} \pm 0.021$ | $2.47^{b} \pm 0.02$ | $83.67^{b} \pm 0.10$ |
| STDB2 | $52.54^{a} \pm 0.08$ | $323.77^{d} \pm 0.10$ | $425.35^{d} \pm 0.07$ | $255.45^{c} \pm 1.20$ | $4.34^{c} \pm 0.021$ | $2.31^{c} \pm 0.01$ | $79.73^{c} \pm 0.18$ |
| STDB3 | $45.46^{c} \pm 0.20$ | $389.82^{a} \pm 0.59$ | $529.39^{a} \pm 1.54$ | $254.65^{d} \pm 0.07$ | $8.76^{a} \pm 0.057$ | $4.63^{a} \pm 0.01$ | $108.47^{a} \pm 0.18$ |

**Values are mean ± standard deviation of samples. $^{a-d}$ Means with similar superscripts within the same column are not significantly different (p>0.05)**

**Table 4: Sensory evaluation of formulated blends**

| Sample | Appearance | Taste | Colour | Flavour | Mouth-feel | General Acceptability |
|---|---|---|---|---|---|---|
| **SBP** | **$7.50^{a}$±1.79** | **$4.70^{b}$±1.69** | **$7.70^{a}$±1.34** | **$4.90^{b}$±1.92** | **$5.30^{b}$±2.30** | **$6.02^{b}$±1.48** |
| **STDB1** | **$7.00^{a}$±1.30** | **$7.25^{a}$±1.62** | **$7.20^{a}$±1.20** | **$7.00^{a}$±1.56** | **$6.75^{a}$±1.83** | **$7.04^{a}$±1.32** |
| **STDB2** | **$7.55^{a}$±1.05** | **$7.70^{a}$±0.86** | **$7.30^{a}$±1.22** | **$7.50^{a}$±1.19** | **$7.30^{a}$±1.49** | **$7.47^{a}$±0.78** |
| **STDB3** | **$7.20^{a}$±0.95** | **$7.40^{a}$±1.35** | **$7.10^{a}$±1.07** | **$7.05^{a}$±1.00** | **$6.70^{a}$±1.49** | **$7.09^{a}$±0.87** |

**Conclusion/Recommendation:** Plant-based milk powder blends demonstrated significant nutritional potential, particularly in providing essential macro and micronutrients. The blends serve as effective alternatives for combating micronutrient deficiencies and protein-energy malnutrition for children and all age groups. Production, affordability, and promotion should be encouraged to improve nutrient intake and support public health nutrition.

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**ATheme/Sub-Theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Effect of Processing Methods on Selected Micronutrient Composition of *Macrotermes bellicosus* ("Esunsun") as a Potential Food Supplement

**[1]Popoola B.R., [2*]Afolabi, O., and [1]Adediji, A.B**
[1]Department of Human Nutrition and Dietetics, Obafemi Awolowo University, Ile Ife, Osun State, Nigeria
[2]Department of Human Nutrition and Dietetics, University of Ilesa, Ilesa, Osun State, Nigeria.
***Corresponding author:** olayemi_afolabi@unilesa.edu.ng, +2347068860956
**Keywords:** Edible Insect, Micronutrients, Food and Nutrition Security, Food Supplement,

**HIGHLIGTHS**

- Dried *M. Bellicosus* fortified with ginger and garlic at (80:15:5) ratio respectively, showed high iron, zinc and vitamin C, as potential food supplement to alleviate hidden hunger.
- Roasting reduced antinutritional factors, while drying preserved micronutrients with acceptable antinutrient concentrations for nutrition security.

**BACKGROUND**: Micronutrient deficiencies and underutilisation of nutrient-dense indigenous foods remain major contributors to food and nutrition insecurity in developing countries [1]. *Macrotermes bellicosus* (African edible termite, locally known as "Esunsun") is a seasonal insect with high nutritional potential [2]. Despite its affordability, ease of harvest and health benefits, there is limited scientific information on the effects of processing and ginger–garlic fortification on its micronutrient composition and antinutritional factors.

**OBJECTIVES**: This study evaluated the effects of processing methods and ginger–garlic fortification on the micronutrient composition and antinutritional factors of *M. bellicosus* as a potential food supplement for alleviating hidden hunger.

**MATERIALS AND METHOD:** *M. bellicosus* were gotten from Ile Ife, Osun State, and were processed into powder through drying and roasting methods, the samples were divided into parts; fortified with ginger and garlic spices at varying ratios, and crayfish was used as the control. The samples were analysed for iron, zinc, vitamin C, phytates, tannin and oxalate using standard analytical grade chemicals and procedures. Statistical analysis was carried out using SPSS version 25, with significance set at $p < 0.05$.

**RESULTS AND DISCUSSION:** Significant differences were observed between the dried and roasted samples. The dried samples fortified with ginger and garlic (80:15:5) improved in iron (34.38±0.53mg/100g), zinc(13.25±0.43mg/100g), and vitamin C (10.91±0.01mg/100g) contents when compared with the crayfish (control). Roasted samples had lower antinutritional content with tannin (0.08±0.02), phytate (0.01±0.00), oxalate (0.06±0.01) which could be due to high heat treatment when compared to drying method [3]. Findings suggest that dried spiced-fortified sample showed a better micro nutrient content with acceptable levels of antinutritional factor capable of improving food and nutrition security.

**CONCLUSION AND RECOMMENDATION:** The dried and spice-fortified samples showed promising potential as sustainable, affordable, and nutrient-rich dietary supplements for addressing hidden hunger. Further studies are recommended to evaluate sensory acceptability, mineral bioavailability, shelf stability, and consumer perception of the fortified termite products.

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**Theme/Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Comparative Evaluation of Antinutrient and Phytochemical Profiles of Two Varieties Each of African Star Apple (*Chrysophyllum africanum* and *Chrysophyllum akusae*) and Banana (*Musa acuminata* and *Musa balbisiana*) Consumed in Southeastern Nigeria

**Name of Author(s):** *Ochemba, P.C.[1] and Oly-Alawuba, N.M.[1]

[1]Department of Nutrition and Dietetics, Faculty of Health Sciences, Imo State University, Owerri.

*Corresponding author, e-mail: priscaochemba@gmail.com, +234 8066048404

**Keywords:** Phytochemicals; Antinutrients; African star apple; Banana

**Highlights**

- *C. africanum* recorded highest flavonoid (7.26 mg/100g) and phenol (6.64 mg/100g)
- All antinutrient values across the four fruit varieties were within safe limits
- African star apple had significantly richer phytochemical profiles than banana

## BACKGROUND AND OBJECTIVES

Fruits are an important source of nutrients and bioactive compounds; knowledge of their composition is therefore imperative for promoting optimal utilisation [1]. In Southeastern Nigeria, African star apple (*Chrysophyllum africanum* and *Chrysophyllum akusae*) and banana (*Musa acuminata* and *Musa balbisiana*) are widely consumed, yet comparative data on their phytochemical and antinutrient profiles remain scarce. This gap limits awareness of processing methods that enhance nutrient bioavailability and contributes to underutilisation. This study aimed to evaluate and compare the phytochemical and antinutrient compositions of these four varieties.

## MATERIALS AND METHOD

Two kilograms each of fresh, ripe *Chrysophyllum africanum*, *Chrysophyllum akusae*, *Musa acuminata*, and *Musa balbisiana* were purchased from Relief Market, Owerri, and authenticated at the Department of Crop Science and Biotechnology, Imo State University. African star apple samples were washed, pulped, seeds removed, and blended (Samples A and B); banana samples were peeled and milled (Samples C and D). Phytochemical (saponin, tannin, phenol, flavonoid, alkaloid) and antinutrient (phytate, oxalate, trypsin inhibitor, cyanogenic glycoside) analyses were conducted using AOAC standard methods [2,3]. Data were analysed using one-way ANOVA and Tukey's post hoc test ($p<0.05$) in SPSS v20.0.

## RESULTS AND DISCUSSION

*Chrysophyllum africanum* (Sample A) had the highest saponin (3.84 mg/100g), phenol (6.64 mg/100g), flavonoid (7.26 mg/100g), and alkaloid (2.83 mg/100g), while *C. akusae* (Sample B) had the highest tannin (1.44 mg/100g). Banana varieties recorded significantly lower phytochemical levels ($p<0.05$). The elevated flavonoid and phenol contents suggest potent antioxidant, anti-inflammatory, and antibacterial activity, consistent with reports that Musa species and other indigenous fruits possess substantial medicinal value [4]. *Musa balbisiana* (Sample D) had the highest phytate (0.077 mg/100g) and oxalate (2.85 mg/100g), while *C. akusae* (Sample B) had the highest trypsin inhibitor (3.07 mg/100g) and cyanogenic glycoside (0.23 mg/100g). All antinutrient values remained below established toxicological thresholds; for example, oxalate toxicity is associated with intakes exceeding 2.5 g per serving [5], confirming the safety of these fruits for direct consumption without mandatory processing.

## CONCLUSION AND RECOMMENDATION(S)

African star apple varieties, particularly *Chrysophyllum africanum*, demonstrated superior phytochemical profiles compared to banana, indicating greater functional food potential for managing hypercholesterolaemia, oxidative stress, and inflammation. All antinutrient levels were within safe thresholds. It is recommended that: (i) *C. africanum* and *C. akusae* be incorporated regularly into diets given their appreciable phytochemical content; and (ii) consumption of these indigenous fruits during their seasons be actively promoted for improved population health.

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**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Topic:** Effects of nutritional properties on the *in vitro* anti-inflammatory activities of cookies from wheat-soybean composite flour blends

**Name of Author (s):** [1*]Ajatta, Mary Anuoluwapo. [1]Kehinde-Olatunji, Olayinka Bolanle, [2]Awe Omotola and [3]Malomo, Sunday Abiodun

**Affiliation of Author (s):** [1]Department of Food Science and Technology, Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti, Ekiti State, Nigeria

[2]Department of Nutrition and Dietetics, College of Technology, Ijero-Ekiti. Ekiti State

[3]Department of Nutrition and Dietetics, Federal University of Technology, Akure, Nigeria

*Corresponding author: ajatta.mary@bouesti.edu.ng; +2348034770944

**Keywords**: Wheat, Soybean, Cookies, Anti-inflammatory, Proximate

**Highlights**

- Cookies were produced from different blends of wheat and soybean
- Anti-cyclooxygenase activity of different cookies at 50% level of inhibition concentration ($IC_{50}$)
- Inhibition of protein denaturation activity of different cookies at 50% level of inhibition concentration ($IC_{50}$)

## BACKGROUND AND OBJECTİVES

Inflammation is caused by injury to a living tissue and it has four primary indicators such as pain, redness, heat or warmness and swelling (1). Cookies offered several important advantages including; wide consumption, relatively long shelf life, good eating quality, highly palatable and acceptable in most countries (2). This study thus, investigated the quality of cookies produced from wheat-soybean composite flour blends at different ratios.

## MATERIALS AND METHOD

The soybean seeds were thoroughly processed, milled, sieved and mixed with the commercial wheat flour. Four blends namely: WSY 1 (100:0), WSY 2 (30:70%), WSY 3 (40:60%) and WSY 4 (50:50%) (wheat:soybean), respectively were prepared and later used to bake cookies. The proximate, anti-inflammatory (protein denaturation and cyclooxygenase inhibition) activities of the composite cookies were examined.

## RESULTS AND DISCUSSION

The results of the proximate composition showed that the composite flour had significant ($p<0.05$) positive effects on the cookies. The inhibition of protein denaturation of composite cookies at 50% inhibition ($IC_{50}$) is presented in Fig 1. It was observed that the composite cookie WSY 3 has low $IC_{50}$ (22 µg/ml) when compared to the control sample (70 µg/ml), which is the 100% wheat cookies (WSY 1). The anti-inflammatory results showed the inhibitory potentials of the cookies against the cyclo-oxygenase activities at low concentration ($IC_{50}$; 12.85 µg/ml, respectively) when compared to sodium diclofenac (18.60 µg/ml), a well-known and common non-steroidal anti-inflammatory drug.

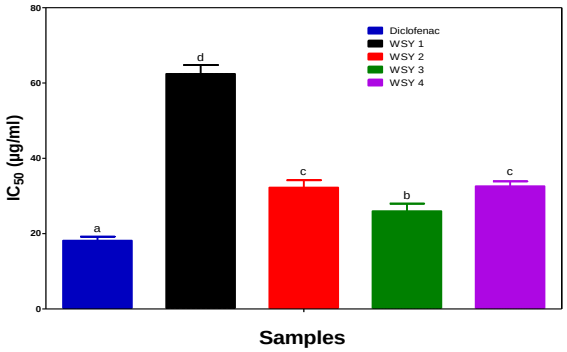



**Fig 1:** Inhibition of protein denaturation activity

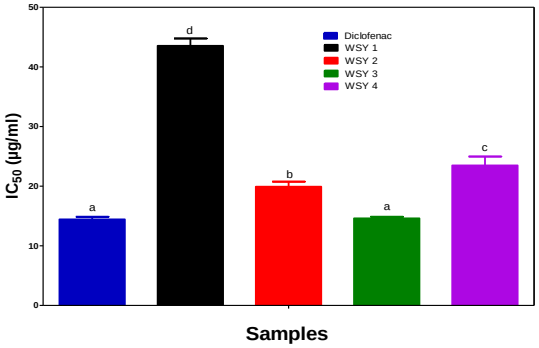



**Fig2**: Anti-cyclooxygenase activity of different cookies

Bars (n=3) with different letter are significantly different ($p<0.05$).

**Key:** WSY 1 = 100% wheat flour; WSY 2 = 30% wheat flour + 70% soybean flour WSY 3 = 40% wheat flour + 60% soybean flour; WSY 4 = 50% wheat flour + 50% soybean

## CONCLUSION:

The use of wheat and soybean flours have been found to improve the proximate composition of the cookies in this study. Also, it has been found as remedy for inflammatory diseases by exhibiting anti-inflammatory activities such as in protein denaturation scavenging activity and anti-cyclooxygenase activities. Most especially from this study, cookies from WSY 3 composite flour, which is 30% wheat flour + 70% soybean flour, showed increase in protein and fibre values compared with the control sample (100% wheat flour).

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**Theme/sub-theme:** Transforming local food systems for improved food security and nutrition

**Title:** Enhancing tomato (*Solanum lycopersicum* L.) Growth through Synergy of Neem-Zinc Oxide Nanoparticles and Plant Growth-Promoting Bacteria

**Name of Author (s):** *Great Odufa Patience[1, 2] and Shittu Hakeem Olalekan[2]

**Affiliation of Author (s):** [1]Department of Biological Sciences, Plant Biology and Biotechnology Unit, Edo University Iyamho; [2] Department of Plant Biology and Biotechnology, University of Benin

*Corresponding author: ikhimalo.patience@edouniversity.edu.ng; (+234) 9166741427

**Keywords:** Neem, Zinc-oxide Nanoparticles, Plant growth-promoting bacteria, Tomatoes.

**Highlights**

1. Molecular identification reveals that some strains of *Acinetobacter* have plant growth promoting abilities; and that there is a synergy between these strains and zinc oxide nanoparticles in promoting the yield of tomato plant.

**BACKGROUND AND OBJECTİVES:** Plant growth-promoting bacteria (PGPB) are utilized in improving plant growth in place of conventional fertilisers. They have potential as biostimulants and biofertilisers; despite the potential of PGPB, field application faces several constraints, including viability in soil and susceptibility to environmental factors [1]. These potentials could be enhanced when combined with nanoparticles. This research investigated the synergy between zinc oxide nanoparticles (ZnO-NPs) and two plant growth-promoting bacteria species: IST 4 and IST 5 on tomato plant growth.

**MATERIALS AND METHOD:** Rhizospheric bacteria were isolated from tomato root soil, cultured, identified and assayed for plant growth promoting (PGP) properties. Species of Isolates with PGP were molecularly identified and co-applied with zinc-oxide nanoparticles for 8 weeks. A total of 6 treatments: the control, ZnO-NPs alone, PGPB alone, and in combination with ZnO-NPs was applied in three replicates and evaluated, resulting in 18 experimental units. Morphological characters were measured and data analysed with one-way ANOVA.

**RESULTS AND DISCUSSION:** One of the most remarkable results in this work was observed in the root length of tomato plants treated with IST 4 + ZnO-NP which also has a significant effect on the length of the stem, plant height, fresh weight, dry weight, and root length. The findings revealed a probable synergistic effect between PGPB and ZnO-NP in the promotion of growth parameters in tomato plants, with the potential to improve the productivity of tomato plants. as reported [2].

**Table 1: Table 4. 1: Treatment of tomato plant using PGPB alone and in-addition with ZnO-NP on different growth parameters**

| TRT* | LTS** | TG | HTP | TLN | TFN | FWTH | DWTH | RLH |
|---|---|---|---|---|---|---|---|---|
| **CTRL** | 7.53±1.96 [a] | 0.2±0.04 | 15 ± 2.35 [a] | 35 ± 5.20 [a] | 0 ± 0.1 [a] | 1.53 ± 0.01 [a] | 0.45 ± 0.01[a] | 3.2 ± 0.52[a] |
| | 3.51±0.70 | 0.23±0.04 | 11 ± 2.31 | 47± 4.37 | 1 ± 0.2 | 1.81 ± 0.03 | 0.33 ± 0.02 | 4 ± 0.58 |
| | 5.73±1.52 | 0.18±0.05 | 19± 2.10 | 20 ± 4.00 | 0 ± 0.5 | 1.92 ± 0.02 | 0.25 ± 0.05 | 5.3 ± 0.91 |
| **IST 4** | 20.00±7.23[c] | 0.26±0.08 | 37 ±4.80 | 100 ± 20.96 | 12 ± 2.21 [b] | 20.31 ± 3.96 | 5.24 ± 1.56[b] | 15 ± 4.11 |
| | 16.47±5.85[b] | 0.26±0.07 | 70±5.22 [c] | 82 ± 10.36 [b] | 5 ± 0.99 [b] | 24.08 ± 4.21[b] | 7.4 ± 1.48 | 14.3 ± 3.17[c] |
| | 13.57±4.23 | 0.27±0.05 | 59 ± 4.33[b] | 88 ± 12.20 [c] | 5 ± 1.21 | 17.44 ± 3.21 | 8.00 ± 1.72[c] | 12 ± 2.22 |
| **IST 5** | 8.94±2.34 [a] | 0.2±0.03 | 35 ± 4.33 [a] | 63 ± 11.22 [b] | 2 ± 0.85 [a] | 12.6 ± 2.73[a] | 3.19 ± 1.14[a] | 4. 6 ± 0.71[a] |
| | 9.86±2.63 [b] | 0.17±2.63 | 28 ± 5.29 | 47 ± 8.00 [a] | 2 ± 0.44 | 13.43 ± 3.04[b] | 3.17 ± 1.02 | 5 ± 1.04 |
| | 7.52±1.59 | 0.02±1.59 | 40 ± 4.01[b] | 50 ± 8.50 | 3 ± 0.58 [b] | 15.9 ± 3.57 | 4.6 ± 1.11[b] | 6 ± 1.95 |
| **IST 4 + NP** | 27.21±7.55 | 0.30± 0.03 | 55.5 ± 6.22 | 126 ± 15.41 | 8 ± 2.43 | 41.39 ± 6.71[b] | 9.19 ± 2.12 | 18 ± 4.76 |
| | 28.53±8.94 [c] | 0.26±0.05 | 63± 4.56 | 95 ± 11.10 | 9 ± 2.75 | 26.31 ± 3. 96 | 6.99 ± 1.51 | 17 ± 4.04 |
| | 19.56 ±6.58 | 0.17 ±0.05 | 74 ± 10.22 [c] | 87 ± 10.13 [c] | 10 ± 3.00 [b] | 28.67 ± 5.16 | 14.07 ± 2.30 [c] | 21 ± 5.22 [d] |
| **IST 5 + NP** | 7.52±1.59 [a] | 0.10±0.07 | 34 ± 3.40[a] | 69 ± 9.22[a] | 0 ± 0.08 [a] | 29.42 ± 4.17[b] | 2.8 ± 0.05[a] | 11 ± 1.86[b] |
| | 9.18±3.22 [b] | 0.26±0.05 | 33 ± 3.21 [b] | 55 ± 5.23 [b] | 4 ± 1.11[b] | 10.19 ± 2.91[a] | 8.6 ± 1.55[c] | 9 ± 2.19 |
| | 16.52±6.09 | 0.21±0.04 | 49 ± 4.20 [c] | 95 ± 11.21[c] | 4 ± 1.11[b] | 13.42 ± 3.02 | 2.9 ± 0.08[b] | 12 ± 2.21[c] |
| **NP** | 15.11±4.6 | 0.33±0.07 | 35 ± 13.2 [a] | 56 ± 6.41[a] | 7 ± 1.29 | 34 ± 4.17 | 3.5 ± 0.17[a] | 9 ± 1.58 |
| | 12.40±3.80 [a] | 0.26±0.06 | 46 ± 6.19 [b] | 80 ± 11.19 [c] | 9 ± 2.11 [b] | 28.67 ± 4.27[b] | 4.0 ± 0.12 [b] | 10 ± 1.82 |
| | 16.53±6.15 [b] | 0.34±0.07 | 40 [b] ± 4.66 [c] | 68 ± 9.31[b] | 8 ± 2.25 | 16.61 ± 3.48 | 5.6 ± 0.19 | 11 ± 1.94 |

Data are expressed as Mean ±SEM. Values in the same column with different alphabetic superscripts are considered significantly different ($P < 0.05$).

*TRT: Treatment; IST 4: Isolate 4; IST 5: Isolate 5; IST 4 + NP: Isolate 4 with ZnO nanoparticles; IST 5 + NP: Isolate 5 with ZnO nanoparticles; NP: ZnO nanoparticles alone.**LTS: Length of tomato stem; TG: Tomato girt;

HTP: Height of tomato plant; TLN: Tomato leaf number; TFN: Tomato flower number; FWTH: Fresh weight of tomato at harvest; DWTH: Dry weight of tomato at harvest; RLH: Root length of tomato at harvest.

**CONCLUSION AND RECOMMENDATİON(S):** this study revealed that there is a synergy between PGPB and ZnO-NP in promoting yield parameters in tomato plants

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**Theme/sub-theme:** Transforming local food systems for improved food security and nutrition

**Title: Redesigning Africa's Plant Based Probiotic Food through Synthetic Biology**

**Name of Author (s):** *Great Odufa Patience[1, 2] and Shittu Hakeem Olalekan[2]

**Affiliation of Author (s):** [1]Department of Biological Sciences, Plant Biology and Biotechnology Unit, Edo University Iyamho; [2] Department of Plant Biology and Biotechnology, University of Benin

*Corresponding author: ikhimalo.patience@edouniversity.edu.ng; (+234) 9166741427

**Keywords:** Probiotics, synthetic biology, Plant-Based Probiotic

**Highlights**

1. A redesign through synthetic biology will not only change the underutilized status of African probiotics but will also enable the development of stable, viable and safe probiotic product in-addition to rewiring them with new functionalities

**BACKGROUND AND OBJECTİVES:**
The discovery of fossil fuels heralded several benefits, including the production of gasoline and production of several petrochemicals, which have since been used as feedstock for drug production. However, due to fossil depletion and other climatic and environmental concerns, the COP28 agreement aims to reduce fossil dependence; this agreement will impact how drugs will be produced. Hence, an alternative means of delivering therapeutic properties other than drugs is urgently needed. This work, aims to explore how synthetic biology and its tools could be used in rewiring or redesigning already existing Africa's Plant-based probiotic product.

**MATERIALS AND METHOD:**
Relevant literature were obtained from sources such as scholar.google.com, sciencedirect.com and pubmed.ncbi.nlm.gov. The literature search was done using keywords related to the topic, in addition, Boolean operators were used to refine searches. Example of search terms includes, "probiotics", "Africa's plant-based probiotics", "synthetic biology" and "synthetic biology and Africa's probiotic foods". Only Peer-reviewed articles were used in identifying major concepts and findings which were organized into thematic section.

**RESULTS AND DISCUSSION:**
Results reveals that some probiotics are currently being explored as drug alternative and that most African probiotics are associated with some fermented foods with Ugba, Pito, Koko, and Poto Poto being some examples. Conversely, we found out that they are yet to attain relevance in the drug/probiotic industry due to poor standardization of microbial contents, insufficient characterization and the lack of strong clinical validation. Findings also reveals that advances in synthetic biology could aid the identification, engineering and optimization of indigenous Africa's plant based probiotic products which could rewire them to offer targeted therapeutic benefits; control food borne pathogens and provide a new avenue for treating a range of gut-related diseases, including Inflammatory Bowel Disease (IBD), Irritable Bowel syndrome (IBS), and Colorectal cancer[2]

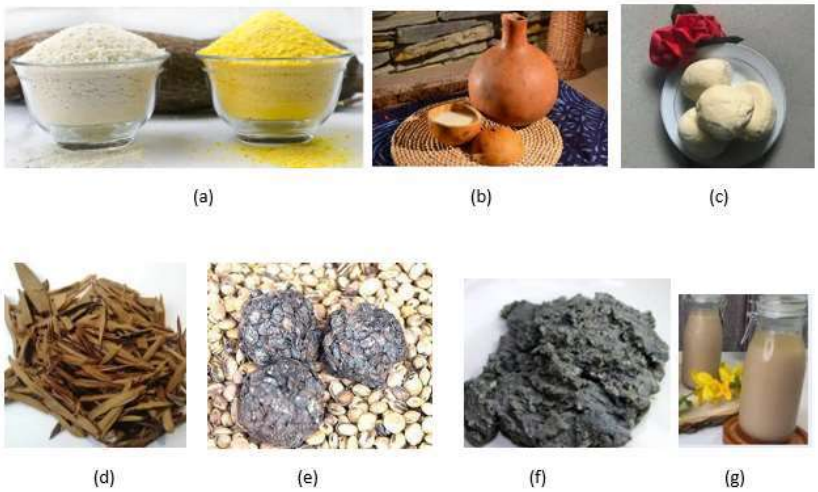



**PLATE 2:** Examples of some Nigerian plant based probiotic food product [1], (a) Garri (*Manihot esculenta*) (b) Palm wine (*Raphia hookeri*) (c) Ogi (*Zea Mays*/*Sorghum bicolor* /*Pennisetum glaucum*) (d) Ugba (*Pentaclethra macrophylla*) (e) Iru (*Parkia biglobosa*) (f) Ogiri (*Citrullus vulgaris*) (g) Kunu (*Sorghum bicolor* /*Pennisetum glaucum*) [1]

## CONCLUSION AND RECOMMENDATİON(S):

This study reveals that Africa's plant-based probiotic food products are currently underutilized but a redesign through synthetic biology will not only change the underutilized status of African probiotics but will also enable the development of stable, viable and safe probiotic product in-addition to rewiring them with new functionalities.

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**Sub-theme: Transforming Local Food Systems For Improved Food Security And Nutrition**

## EVALUATION OF VITAMIN A CONTENT IN *KWASH* PAP ENRICHED WITH ORANGE FLESHED SWEET POTATO, RED MAIZE, SOYBEAN, AND GROUNDNUT

**Eduzor E. [1*], Adesanya, O. D [2], Jacob, G. A.[1], Bello S. H. [2], Oche, O. R[3]., Ladan A. Z[2] and Idris U. M. [2]**

[1]Department of Food Science and Technology, Federal Polytechnic Bauchi, P.M.B. 023, Bauchi State, Nigeria.
[2]Department of Nutrition and Dietetics, Federal Polytechnic Bauchi, P.M.B. 023, Bauchi State, Nigeria.
[3]Department of Food Science and Technology, Federal University of Technology Minna, Minna, Nigeria.
*Corresponding Author: E-mail:esthereduzor@fptb.edu.ng
**Keywords:** β-carotene, enrichment, formulation, flour

**Highlights**:

- Vitamin A content increased significantly with the inclusion of orange-fleshed sweet potato
- The increase in vitamin A was directly related to the level of OFSP incorporation and was mainly attributed to its high β-carotene content, a precursor of vitamin A.
- Enrichment of *kwash* pap with OFSP, soybean, and groundnut improved its nutritional quality

### BACKGROUND AND OBJECTIVES:

Vitamin A is an essential nutrient required for vision, immune function, growth, and overall health, but it must be obtained from dietary sources because the body cannot synthesize it [1]. Vitamin A deficiency remains a significant public health problem in developing countries, contributing to blindness, weakened immunity, infections, and increased mortality, particularly among children and women [2]. *Kwash* pap, a traditional Nigerian fermented maize-based weaning food enriched with protein, is commonly consumed but contains low levels of vitamin A. This study evaluated the vitamin A content of *kwash* pap enriched with orange-fleshed sweet potato, red maize, soybean, and groundnut to enhance its nutritional quality.

### MATERIALS AND METHODS

Orange-fleshed sweet potato (OFSP), red maize, soybean, and groundnut were obtained from Muda Lawal Market in Bauchi. The method of [3] was used for processing of the OFSP. Yellow maize and soybean were processed into flour using standard methods. Four composite formulations were prepared using different proportions and coded samples included OMSGW (350 g maize, 0 g OFSP), OMSGX (300 g maize, 50 g OFSP), OMSGY (250 g maize, 100 g OFSP), and OMSGZ (200 g maize, 150 g OFSP), while soybean (100g) and groundnut (50g) levels remained constant. The composite blends were reconstituted and processed into *kwash* pap. Vitamin A content was determined using standard HPLC spectrometer and expressed as mgRE/100g. Data obtained were analyzed using Analysis of Variance (ANOVA) and means were separated using Duncan Multiple Range Test (DMRT) at $p < 0.05$.

### RESULTS AND DISCUSSION

The Vitamin A content of the pap samples differed significantly ($p < 0.05$), with values ranging from 0.1521 mg RE/100 g to 2.6517 mg RE/100 g representing the control and the highest incorporation of OFSP respectively. In contrast, OMSGZ showed the highest Vitamin A content (2.6517 mg RE/100 g), followed closely by OMSGY (2.4450 mg RE/100 g), while OMSGX recorded 2.3400 mg RE/100 g. The higher values observed in OMSGZ, OMSGY, and OMSGX demonstrate the positive contribution of orange-fleshed sweet potato enrichment to provitamin A content with incremental level of OFSP. The increased vitamin A content observed in the enriched samples demonstrated the positive contribution of OFSP to provitamin A enrichment. The high β-carotene content of OFSP likely accounted for the improved vitamin A values observed in the formulations described by [4].

**Table 1: Vitamin A (mg RE/100g) summary**

| **Sample** | OMSGW | OMSGX | OMSGY | OMSGZ |
|---|---|---|---|---|
| **Vitamin A (mg RE/100g)** | $0.1521^{a}$ | $2.3400^{b}$ | $2.4450^{b}$ | $2.6517^{c}$ |

Values represent mean ± standard deviation of vitamin A**.** There was a significant ($p < 0.05$) increase in vitamin A levels across enriched samples compared with the control. OMSGW Maize 70%: OFSP 0%: Soybean 20%: and Groundnut 10%, OMSGX Maize 60%: OFSP 10%: Soybean 20%: and Groundnut 10%, OMSGY Maize 50%: OFSP 20%: Soybean 20%: and Groundnut 10% and OMSGZ Maize 50g: OFSP 30%: Soybean 20%: and Groundnut 10%

## CONCLUSION

The study showed that enriching *Kwash* pap with orange- flesh sweet potato, soybeans, and groundnut significantly increased its vitamin A content, making it a promising and affordable food-based approach for reducing vitamin A deficiency among vulnerable groups.

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**Sub-theme: Transforming Local Food Systems for Improved Food Security And Nutrition**

# EVALUATION OF PROXIMATE COMPOSITION OF BISCUITS PRODUCED FROM WHEAT–FONIO COMPOSITE FLOUR

**Eduzor E. [1*], Adesanya, O. D [2], Jacob, G. A.[1], James S[3]., [2], Hamisu, M.[1], and Abdulrazak B. B. [2]**

[1]Department of Food Science and Technology, Federal Polytechnic Bauchi, P.M.B. 023, Bauchi State, Nigeria.
[2]Department of Nutrition and Dietetics, Federal Polytechnic Bauchi, P.M.B. 023, Bauchi State, Nigeria.
[3]Department of Food Science and Technology, Federal University of Technology Minna, Minna, Nigeria.
*Corresponding Author: E-mail:esthereduzor@fptb.edu.ng
**Keywords:** Ash, dietary, fat, proximate, mineral

**Highlights:**

- Moisture content level indicated shelf stability of the biscuit
- Crude fibre showed markedly improvement with increased addition fonio
- The addition of fonio significantly improved level of protein content of the biscuits

## BACKGROUND AND OBJECTIVES:

Biscuits are widely consumed because of their convenience, affordability, pleasant taste, and long shelf life, making them suitable vehicles for nutritional improvement [1]. However, most biscuits are produced from refined wheat flour, which contains low levels of dietary fiber and essential micronutrients. Dietary fiber plays an important role in digestive health, blood sugar control, and reducing the risk of obesity, diabetes, and cardiovascular diseases [2]. Fonio (*Digitaria exilis*), an ancient West African grain, is rich in fiber, essential amino acids, iron, zinc, and magnesium, and also possesses a low glycemic index, making it beneficial for healthier food formulations [3].

## MATERIALS AND METHODS

Raw materials including wheat flour, fonio grains, sugar, butter, eggs, baking powder, and salt were purchased from Gwallameji Market, Bauchi State, Nigeria. Fonio grains were processed into flour and used to formulate biscuits through an experimental research design. Four coded samples were prepared: Sample A (100% wheat flour), Sample B (80:20 wheat–fonio flour), Sample C (60:40), and Sample D (40:60). Standard baking procedures with slight modifications were adopted to accommodate fonio substitution [4] was used for analysis of proximate composition.

## RESULTS AND DISCUSSION

The proximate composition of wheat–fonio composite biscuits showed progressive nutritional variations across coded formulations (Sample A–D) as shown in Table 1. Ash content increased from 1.65% to 3.53%, reflecting improved mineral density due to fonio inclusion [3]. Crude fiber rose significantly from 1.48% to 5.48%, demonstrating enhanced dietary fiber content beneficial for digestive health [2].

**Table 1: Proximate Composition of Biscuit Samples**

| Parameter (%) | Sample A | Sample B | Sample C | Sample D |
|---|---|---|---|---|
| Moisture | $8.96 \pm 0.06^{b}$ | $8.74 \pm 0.20^{c}$ | $9.89 \pm 0.16^{a}$ | $9.97 \pm 0.04^{a}$ |
| Ash | $1.65 \pm 0.21^{d}$ | $2.28 \pm 0.18^{c}$ | $2.68 \pm 0.18^{b}$ | $3.53 \pm 0.32^{a}$ |
| Crude Fiber | $1.48 \pm 0.18^{d}$ | $3.05 \pm 0.21^{c}$ | $4.23 \pm 0.18^{b}$ | $5.48 \pm 0.25^{a}$ |
| Fat | $2.30 \pm 0.21^{d}$ | $5.23 \pm 0.25^{c}$ | $7.55 \pm 0.21^{b}$ | $10.95 \pm 0.21^{a}$ |
| Protein | $8.23 \pm 0.04^{d}$ | $10.24 \pm 0.06^{c}$ | $12.78 \pm 0.04^{b}$ | $15.15 \pm 0.07^{a}$ |
| Carbohydrate | $77.39 \pm 0.70^{a}$ | $70.47 \pm 0.49^{b}$ | $62.88 \pm 0.76^{c}$ | 54.93 $0.89^{d}$ |

Values are expressed as Mean ± Standard Deviation. Means with different superscripts across the same row differ significantly ($p < 0.05$). Sample A (Control): 100% wheat flour, Sample B: 80% wheat flour + 20% fonio flour, Sample C: 60% wheat flour + 40% fonio flour and Sample D: 40% wheat flour + 60% fonio flour.

Protein increased from 8.23% to 15.15%, while fat increased from 2.30% to 10.95%, showing the nutritional contribution of fonio flour to overall product quality. Conversely, carbohydrate content decreased from 77.39% to 54.93%, indicating a shift toward a more protein and fiber-rich formulation. Overall, results confirm that fonio flour significantly improves the nutritional profile of wheat-based biscuits, supporting its use as a functional ingredient in bakery products and aligning with global recommendations for healthier, fiber-rich diets.

## CONCLUSION

The study showed that fonio flour improved biscuit nutrition by increasing protein, fiber, fat, and mineral contents without reducing acceptability at moderate levels.

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**Theme/Subtheme**: Transforming Local Food Systems for Improved Food Security and Nutrition
**Title**: Characterisation of the Food Environment in Selected Tertiary Institutions in Ogun State.
**Name of Authors**: *Abdussalaam, R.O. [1], Afolabi, W.A.O.[1], Onabanjo, O.O.[1], Alarima, I.I.[2]
**Affiliations of Authors**: [1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Nigeria
[2]Department of Agricultural Extension and Rural Development, Federal University of Agriculture, Abeokuta, Nigeria.
*Corresponding author: sannirukayat@gmail.com | Tel: +2348066896001
Keywords: Food environment; Campus nutrition; mRFEI; Food desert.

**Highlights:**

- Only 25.2% of outlets were classified as healthy.
- Sugar-sweetened beverages (SSBs) were the most widely available food group (64.0%), while vitamin A-rich fruits and vegetables were available in fewer than 8% of outlets.

**BACKGROUND AND OBJECTIVES:**
Non-communicable diseases (NCDs) are rising among young adults globally [1], and the food environment is increasingly recognized as a key structural determinant of dietary behaviour [2]. However, the majority of food environment studies have been conducted in high-income countries, campus food environments in sub-Saharan Africa remain largely uncharacterized. This study aimed to characterize the food environment in selected tertiary institutions in Ogun State, Nigeria, through an assessment of food outlet availability, classification, spatial distribution, and food group diversity.
**MATERIALS AND METHOD:** A cross-sectional, mixed-methods design was employed. An exhaustive census of food outlets was conducted across four institutions - Federal Polytechnic Ilaro (FPI), Federal University of Agriculture Abeokuta (FUNAAB), Babcock University (BABCOCK), and Bells University of Technology (BELLS) - using GPS-enabled field audits, QGIS spatial analysis, and a validated food environment audit tool. Outlets were classified using the USAID Advancing Nutrition taxonomy [3]. The modified Retail Food Environment Index (mRFEI), Market Food Diversity Index (MFDI), and spatial density measures were computed.
**RESULTS AND DISCUSSION**: A total of 314 food outlets were enumerated across the four institutions. The overall mRFEI was 0.252, this falls well below the threshold associated with environments that adequately support healthy dietary choice. Comparably low mRFEI values have been reported in neighbourhood food environments in Ghana (Mensah et al., 2022) and in peri-urban market settings in Tanzania (Ambikapathi et al., 2021), confirming that the SSA food retail landscape is broadly characterized by a dearth of healthy food access. Convenience stores (36.9%) and restaurants (22.9%) were the dominant outlet types. Soft drinks and sugar-sweetened beverages (SSBs) were the most widely available food group, present in 64.0% of outlets, while vitamin A-rich fruits and vegetables were available in fewer than 8% of outlets. The mean number of DQQ food groups available per outlet was 6.94 out of 29, this represents a constraint that would make dietary diversity targets virtually impossible to achieve through campus food sources alone. Over a third (36.3%) of all outlets displayed promotional signage for unhealthy products.

Table 1: Vendor health classification and modified Retail Food Environment Index (mRFEI) by institution

| Institution | N | Healthy n (%) | Intermediate n (%) | Unhealthy n (%) | mRFEI | Remark |
|---|---|---|---|---|---|---|
| **FPI** | 59 | 21 (35.6) | 7 (11.9) | 31 (52.5) | 0.356 | Food desert risk |
| **FUNAAB** | 141 | 28 (19.9) | 35 (24.8) | 78 (55.3) | 0.199 | Food desert risk |
| **BABCOCK** | 34 | 7 (20.6) | 14 (41.2) | 13 (38.2) | 0.206 | Food desert risk |
| **BELLS** | 80 | 23 (28.7) | 47 (58.8) | 10 (12.5) | 0.288 | Food desert risk |
| **Total** | 314 | 79 (25.2) | 103 (32.8) | 132 (42.0) | 0.252 | Unhealthy |

**CONCLUSION AND RECOMMENDATİON(S):** Campus food environments in these tertiary institutions are characterised by a predominance of unhealthy food outlets, limited availability of fresh fruits and vegetables, and pervasive promotion of ultra-processed foods. Campus food policy reform, vendor regulation, and evidence-based institutional nutrition programmes are recommended to reduce students' exposure and risk of NCD risk.

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**Sub-theme; Transforming Local Food Systems for Improved Food Security and Nutrition**

**Topic:** Formulation and Sensory Profiling of Plant-Based Margarine Produced with Indigenous Palm Kernel, Coconut and Melon Oil Blends

*Aburime, L. C[1] Onyeweaku, E O. [2] and Okoye, C. I.[3]

[1-3] Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences, University of Calabar, Nigeria. *PMB 1115, Eta 540004, Etta Agbo Rd, Calabar, Nigeria*

[2] *Food Evolution Research Centre, College of Business & Economics, University of Johannesburg, Johannesburg 2092. South Africa.*

*Corresponding author's email: aburimelilian@gmail.com*

**Key words:** Margarine, Sensory Evaluation, Oil Blends, Under-utilised seeds

**Highlights:**

- The 25:50:25 (coconut oil:melon oil:palm kernel oil) blend is optimal for margarine production, achieving the highest overall sensory acceptability
- unrefined melon seed oil provides a natural yellow hue and nutty flavour profile that aligns with consumer expectations for premium commercial margarine.
- high concentrations of virgin coconut oil introduce texture and soapy flavour defects when used for margarine formulation without industrial deodorization.

**BACKGROUND AND OBJECTİVES:** Global demand for healthy, sustainable, plant-based foods drives margarine innovation. As an affordable, long shelf-life dairy-butter alternative, margarine acceptability depends on its physicochemical and sensory traits [1]. This study evaluated the sensory characteristics and consumer acceptability of margarine formulated from indigenous, underutilized tropical oil blends. Melon seed, palm kernel, and coconut oils were extracted through aqueous and thermal methods, refined, and combined with a standardized base in three specific volumetric ratios: 50:25:25 (CM), 25:50:25 (MM), and 25:25:50 (PM). **MATERIALS AND METHOD**: Margarine samples were produced by combining these blends with a standardized base recipe of milk, egg yolk, lemon juice, salt, and turmeric, emulsified over an ice bath and solidified in a freezer. A 20-member screened panel evaluated the formulations alongside a commercial control using a 9-point hedonic scale. Data were analyzed using Analysis of Variance (ANOVA) and Fisher's LSD ($P < 0.05$).

**RESULTS AND DISCUSSION:** Results revealed that the melon oil-dominant formulation (MM) performed exceptionally well across most sensory attributes. Sample MM achieved the highest significant scores for colour (8.67), aroma (8.67), taste (7.89), and spreadability (8.78). The superior performance of the melon oil–dominant blend also supports findings from studies on vegetable oil blending, which have demonstrated that combining oils with complementary physicochemical properties can improve the sensory and functional qualities of food products. For example, blending oils with different melting behaviours and fatty acid compositions has been shown to optimise texture, consistency, and consumer acceptability in margarine and spread formulations [2]. Conversely, the coconut oil-dominant formulation (CM) recorded the lowest sensory scores for aroma (5.00), taste (4.60), texture (6.70), and general acceptability (6.18), indicating slight dislike to neutral responses. This could be that without chemical interesterification or thorough industrial deodorization, high concentrations of virgin coconut oil introduces unacceptable flavour and texture defects in table margarines [3]. The palm kernel oil formulation (PM) and the commercial control showed statistically similar ($P > 0.05$) ratings for taste, spreadability, and general acceptability, with both being liked moderately.

**CONCLUSION AND RECOMMENDATİON(S):** This study demonstrates that blending underutilized local resources, particularly with a higher concentration of melon seed oil, offers a viable, nutritionally diverse, and consumer-acceptable alternative to conventional commercial margarine.

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**SUB THEME: Transforming Local Food Systems for Improved Food Security and Nutrition**

# Proximate, Nutritional Composition, and Sensory Evaluation of Complementary Food Made from Plant-Based Cereal and Legumes (Soya Bean, Sorghum and Groundnut)

Quadri, J.A.[1], Deniran, I.A.[1], Akinremi, T.I.[1], Edun, B.T.[2], Osinowo, Y.J.[2]
[1] Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria
[2] Department of Nutrition and Dietetics, Ogun State Polytechnic of Health and Allied Sciences, Ilese-Ijebu, Ogun State.
Correspondence: jaquadri@lautech.edu.ng, 2348034939246

**Keywords:** Complementary feeding, Infant, Nutrient composition, Sensory evaluation

**Highlights:**

- Sorghum–soybean–groundnut composite blends were developed as low-cost complementary foods with improved protein, fat, and micronutrient contents.
- The formulated blends showed appreciable vitamin and mineral profiles, indicating potential to improve nutrient intake during complementary feeding.
- Processing and formulation affected nutrient composition, anti-nutrient levels, and sensory quality, with a balanced cereal–legume blend achieving the highest consumer acceptability.

## BACKGROUND AND OBJECTİVES:

Malnutrition among infants and young children is one of the key nutritional problems facing today, largely attributable to improper complementary feeding practices and eating diets with poor nutrient density. The inclusion of legumes in cereals will enhance nutritional value by complementing protein and increasing the availability of micronutrients (1). In this study, the proximate, micronutrient, and antinutrient compositions and sensory attributes of complementary foods made from sorghum, soybean, and groundnut blends were examined.

## MATERIALS AND METHODS:

Blends of composite flour were formulated based on various ratios of sorghum, soybean, and groundnut to produce the complementary food. Samples A (70% sorghum, 20% soybeans, 10% groundnuts), B (50% sorghum, 30% soybeans, 20% groundnuts), and C (30% sorghum, 40% soybeans, 30% groundnuts) are the formulation ratios.

The proximate composition was analyzed using AOAC (2) methods, while vitamins, minerals, and antinutrients were analyzed using standard laboratory methods. Sensory analysis was done using a nine-point hedonic scale involving 20 untrained panelists.

The results were given as means ± standard deviation of three independent determinations. One-way Analysis of Variance (ANOVA) was used to compare the means, and Duncan's multiple range test was used to separate the means. All analyses were performed using SPSS Version 20.0, and significance was set at the 5% level.

## Results and Discussion:

The cereal–legume complementary food blends showed significant improvements ($p < 0.05$) in protein (15.93–16.44%), fat (4.91–5.17%), iron (28.77–41.06 mg), and calcium (0.15–0.35 g), with Sample C exhibiting the highest nutrient values, while Sample B recorded the greatest sensory acceptability (7.50). These findings demonstrate that fortification of sorghum with soybean and groundnut enhances the nutritional quality and consumer acceptability of complementary foods, consistent with previous reports that cereal–legume combinations improve protein quality, micronutrient density, and dietary adequacy for infants and young children (1, 3).

**Table 1: Proximate and micronutrient Composition of the Samples**

| Parameter | Sample A | Sample B | Sample C | F | p-value |
|---|---|---|---|---|---|
| Crude Protein (%) | 15.93 ± 0.04[c] | 16.23 ± 0.06[b] | 16.44 ± 0.06[a] | 75.81 | < .001 |
| Fat (%) | 4.91 ± 0.02[c] | 5.09 ± 0.02[b] | 5.17 ± 0.02[a] | 157.77 | < .001 |
| Crude Fibre (%) | 2.75 ± 0.03[a] | 2.62 ± 0.03[b] | 2.54 ± 0.03[c] | 37.44 | < .001 |
| Ash (%) | 6.82 ± 0.03[a] | 6.69 ± 0.03[b] | 6.61 ± 0.04[c] | 33.19 | .001 |
| Moisture | 11.66 ± 0.01[a] | 11.48 ± 0.03[b] | 11.41 ± 0.03[c] | 105.45 | < .001 |
| Carbohydrate (%) | 57.93 ± 0.06[a] | 57.89 ± 0.05[a] | 57.83 ± 0.07[a] | 2.19 | .193 |
| **Micronutrients** | | | | | |
| Vitamin $B_1$ (mg) | 1.14 ± 0.02 | 1.61 ± 0.03 | 1.69 ± 0.02 | 93.5 | < .001 |
| Vitamin $B_2$ (mg) | 0.07 ± 0.00 | 0.08 ± 0.00 | 0.09 ± 0.00 | 170.14 | < .001 |
| Vitamin $B_3$ (mg) | 3.47 ± 0.02 | 3.70 ± 0.02 | 3.86 ± 0.02 | 89.5 | < .001 |
| Vitamin D (µg) | 21.85 ± 0.02 | 27.17 ± 0.02 | 31.90 ± 0.02 | 102.2 | < .001 |
| Vitamin E (mg) | 25.70 ± 0.03 | 39.81 ± 0.03 | 42.07 ± 0.02 | 47.7 | < .001 |
| Calcium (g) | 0.15 ± 0.02 | 0.26 ± 0.02 | 0.35 ± 0.02 | 84.61 | < .001 |
| Magnesium (g) | 0.34 ± 0.02 | 0.41 ± 0.02 | 0.47 ± 0.02 | 48.58 | < .001 |
| Iron (mg) | 28.77 ± 0.02 | 36.31 ± 0.03 | 41.06 ± 0.02 | 104.2 | < .001 |
| Zinc (mg) | 25.20 ± 11.55 | 33.76 ± 0.02 | 35.90 ± 0.02 | 2.16 | .196 |

**Note.** Values are mean ± standard deviation of triplicate determinations. Means with different superscripts within the same row differ significantly ($p < .05$) based on LSD post-hoc tests.

**Table 2: Sensory Evaluation of the Blends**

| Attribute | Sample A | Sample B | Sample C | F | p-value |
|---|---|---|---|---|---|
| Colour | 6.30 ± 1.59[a] | 6.95 ± 1.23[a] | 6.80 ± 1.36[a] | 1.18 | .316 |
| Taste | 5.00 ± 1.45[b] | 7.40 ± 1.60[a] | 5.30 ± 1.66[b] | 13.83 | <.001 |
| Texture | 5.75 ± 0.97[b] | 6.85 ± 1.60[a] | 5.70 ± 1.30[b] | 4.89 | .011 |
| Appearance | 5.20 ± 1.58[b] | 6.00 ± 1.41[b] | 6.35 ± 1.14[a] | 3.61 | .033 |
| Flavor | 5.75 ± 1.97[b] | 6.65 ± 1.63[a] | 5.50 ± 1.61[b] | 2.41 | .099 |
| Overall Acceptability | 5.85 ± 1.57[b] | 7.50 ± 1.54[a] | 5.70 ± 1.78[b] | 7.49 | .001 |

Note. Values are means ± SD of triplicate determinations. Different superscripts ([a],[b],[c]) within the same row indicate significant differences at $p < .05$ based on LSD post-hoc analysis.

**CONCLUSION AND RECOMMENDATİON(S):**

The developed cereal–legume blends had improved nutritional qualities and possessed satisfactory sensory properties, thus making them potential low-cost complementary foods for infants and children. Shelf-life and safety of the developed products should be further evaluated. Local cereals-legumes-based food should be promoted within nutrition education programmes.

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**Effect of Postharvest Changes on the Quality Attributes of Cucumber from Maturity to Senescence**

**Esther Oluyinka Pele[1], Mohammed Chindo Ibrahim[1], George Ifeoluwa Pele[2] and Bayonle Idris Omisore[2]**
[1]Department of Food Technology, Federal Polytechnic, Offa, P.M.B. 420, Offa,
Kwara State, Nigeria.
[2]Department of Human Nutrition and Dietetics, Federal University of Health Sciences,
Ila-Orangun, P.M.B. 204, Ila-Orangun, Osun State, Nigeria.
Department of Human Nutrition and Dietetics, Federal University of Health Sciences,
Ila-Orangun, P.M.B. 204, Ila-Orangun, Osun State, Nigeria.
Mobile: +2348034899527; +2347068275387
Email: ife_pele@ymail.com

**Keywords**: Cucumber, Maturity, Postharvest Changes, Ripening, Senescence

## BACKGROUND AND OBJECTIVES

The nutritional significance of fruits has been thoroughly studied due to growing awareness of food safety [1]. Fruit consumption has been linked to a reduced risk of cancer, heart diseases, and other health benefits [2]. Fruits have been broadly divided into climacteric and non-climacteric depending on the unique respiratory patterns they exhibit during the ripening process [3]. The aim of the present research is to understudy the effect of postharvest changes on the quality attributes of cucumber from maturity to senescence.

## MATERIALS AND METHODS

Cucumber was harvested at maturity from a local farm in Jos Plateau for immediate quality study. High quality laboratory chemicals for physicochemical properties, proximate and vitamin compositions were sourced from both domestic and foreign analytical store. Matured cucumber was sorted and graded for uniformity and wholesomeness and thereafter, at room temperature, subjected to evaluation for physicochemical properties, proximate and vitamins compositions from maturity to senescence. The physicochemical properties, proximate and vitamin compositions were carried out according to the methods described by Association of Official Analytical Chemists [4].

## RESULTS AND DISCUSSION

The postharvest changes observed in cucumber fruits stored under ambient conditions demonstrated gradual physiological and biochemical changes from maturity to senescence. Throughout the 83-day storage period, parameters such as pH, total soluble solids (TSS), glucose, weight, volume, and specific gravity increased steadily, while titratable acidity (TA), length, and width showed gradual declines. These trends indicate the metabolic changes associated with continous ripening and senescence under ambient conditions, where respiration and enzymatic activity remain high. The significant increase in pH from 3.6 to 6.6, accompanied by a corresponding decrease in titratable acidity from 0.348% to 0.244%, which is an indication of progressive utilization of organic acids as respiratory substrates. Organic acids like citric and malic acid are metabolized through the tricarboxylic acid (TCA) cycle to produce energy for ongoing metabolic processes [5]. Similar increases in pH and decreases in acidity during ambient storage have been reported in cucumber [6] and other non-climacteric fruits such as zucchini and bell pepper [7]. Proximate composition analysis revealed progressive alterations in the biochemical constituents of cucumber fruits throughout the 83-day storage period. The results demonstrated a continuous increase in moisture, ash, crude fibre, lipids, and protein, while carbohydrate content showed a marked decline. The steady increase in moisture content from 74.49% to 86.91 % may be attributed to metabolic water production during respiration and catabolic reactions [8]. Enhanced lipid and protein levels may result from the concentration effect due to moisture increase, as well as metabolic changes involving synthesis of stress-related proteins and membrane lipids [9]. Conversely, carbohydrate content decreased markedly from 22.14 % to 6.37 %. This sharp decline reflects the consumption of soluble sugars and polysaccharides during respiration and enzymatic degradation, which provide the energy required to sustain postharvest metabolism [10]. The vitamin composition of cucumber showed a steady and consistent increase in

the levels of vitamins A, C, and E throughout the 83-day storage period. Vitamin A content rose from 0.151 mg/100 g to 0.291 mg/100 g, vitamin C from 4.57 mg/100 g to 6.03 mg/100 g, and vitamin E from 15.45 mg/100 g to 16.69 mg/100 g. The rise in vitamin A likely results from the ongoing conversion of carotenoid precursors, such as β-carotene, during postharvest ripening. Similar increases in carotenoid content have been reported in cucurbits and other green vegetables as chlorophyll degrades and carotenoid synthesis continues [11]. Vitamin C (ascorbic acid) is a key antioxidant involved in oxidative stress regulation; its progressive increase may be attributed to enhanced synthesis in response to postharvest oxidative metabolism [12]. The increase in vitamin E (α-tocopherol) suggests an adaptive antioxidative response to elevated reactive oxygen species generated during respiration and senescence [13].

## CONCLUSION

Progressive increases in pH, total soluble solids, glucose, moisture, and selected vitamins were accompanied by declines in titratable acidity and carbohydrate content, indicating active respiration and substrate utilization after harvest. Physical alterations, including dimensional shrinkage at later stages, further reflect advancing tissue senescence.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition.

**Title:** Effect of Household Cooking Methods on Nutrient Retention of *Amaranthus hybridus L. and Telfairia occidentalis*: Implications for Food Security and Nutrition.

**Authors:** Adam, F. G.[1], Abba, S. J.[1*].

**Affiliation:** [1]Department of Biochemistry & Nutrition and Dietetics, Bayero University Kano.

Corresponding author, e-mail: sjabba.bch@buk.edu.ng +2347034888724

**Keywords:** Nutrient Retention, Indigenous leafy vegetables, Food security.

**Highlights:**

- Steaming retained more nutrients than boiling in indigenous leafy vegetables.
- Boiling caused greater losses of water-soluble vitamins and minerals.
- Improved household cooking practices can enhance food security and nutrition.

**Background and Objectives:**

Leafy vegetables are important sources of essential nutrients such as vitamins, minerals, and dietary fibers, and phytochemicals, which contribute significantly to human health and nutrition. Smooth amaranth (*Amaranthus hybridus L.)* and fluted pumpkin (*Telfairia occidentalis*) are widely consumed indigenous leafy vegetables in Nigeria [1]. However, household cooking methods may affect their nutritional composition. This study compared the effect of boiling and steaming on the nutritional content of smooth amaranth and fluted pumpkin leaves.

**Materials and Methods:**

Fresh samples were obtained from Rafin Dan Nana garden, in Kano state, Nigeria, and authenticated at the herbarium of Bayero University Kano. The edible portions were washed and divided into raw, boiled and steamed groups. Boiling and steaming were carried out at 100°C under controlled conditions. The samples were shade-dried, milled into powder, and analysed for proximate composition, mineral content, and selected vitamins using standard analytical procedures [2].

**Results and Discussion:**

Processing significantly affected the nutritional composition of both smooth amaranth and fluted pumpkin. In smooth amaranth, the raw sample had the highest carbohydrate content (60.07±1.09), whereas boiling increased moisture content (15.45±0.55), and steaming showed better nutrient retention, including higher vitamin A and calcium levels. Similarly, in fluted pumpkin, the raw sample recorded the highest carbohydrate content (47.9±1.59), while boiling increased moisture content but reduced some heat-sensitive nutrients [3].

**Table 1: Proximate Analysis.**

| Plant | Methods | Carbohydrate | Protein | Fat | Moisture | Ash | Fiber |
|---|---|---|---|---|---|---|---|
| Amaranthus | Shade | 60.07±1.09 | 1.90±0.36 | 5.61±0.25 | 7.24±1.26 | 6.85±0.56 | 18.30±0.62 |
| Amaranthus | Boiled | 55.62±0.97 | 2.47±0.85 | 2.59±0.23 | 15.45±0.55 | 15.57±0.27 | 8.31 ±0.10 |
| Amaranthus | Steamed | 53.95±1.35 | 1.73±0.15 | 3.73±0.36 | 9.05 ± 1.29 | 18.79±0.31 | 12.74±0.70 |
| Pumpkin | Shade | 47.90±1.59 | 1.77±0.35 | 6.31±0.48 | 3.52 ± 0.59 | 21.70±0.20 | 18.47±0.24 |
| Pumpkin | Boiled | 48.48±1.06 | 2.20±0.10 | 2.66±0.60 | 15.55±0.12 | 21.62±0.41 | 9.48 ±0.83 |
| Pumpkin | Steamed | 57.21±0.40 | 1.67±0.25 | 6.30±0.62 | 7.71 ± 0.25 | 11.58±0.13 | 15.53±0.17 |

**Table 2: Mineral Analysis.**

| Plant | Methods | Calcium | Magnesium | Iron | Vitamin C | Vitamin B3 | Vitamin A |
|---|---|---|---|---|---|---|---|
| Amaranthus | Shade | 80.56±0.10 | 2.56±0.00 | 3.90±0.01 | 3.48±0.04 | 9.50±0.36 | 18.30±0.62 |
| Amaranthus | Boiled | 82.67±0.12 | 2.58±0.00 | 4.66±0.00 | 1.99±0.01 | 7.88±0.02 | 8.31 ±0.10 |
| Amaranthus | Steamed | 87.06±0.33 | 2.63±0.00 | 4.96±0.10 | 1.80±0.02 | 5.69±0.04 | 12.74±0.70 |
| Pumpkin | Shade | 86.94±0.22 | 2.64±0.00 | 5.99±0.02 | 2.72±0.08 | 8.25±0.00 | 18.47±0.24 |
| Pumpkin | Boiled | 88.27±0.38 | 2.66±0.00 | 8.12±0.01 | 3.44±0.08 | 4.99±0.14 | 9.48 ±0.83 |
| Pumpkin | Steamed | 85.08±0.11 | 2.59±0.00 | 3.38±0.04 | 1.86±0.02 | 6.03±0.02 | 15.53±0.17 |

**Conclusion**

These findings indicate that cooking methods significantly influence the nutritional quality of leafy vegetables, and steaming is therefore recommended as a better cooking method for preserving the nutritional value of smooth amaranth and fluted pumpkin leaves.

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**Sub Themes:** Transforming local food system for improved food security and Nutrition

**Title:** Proximate Analysis and Physicochemical Properties of Peanut Burger

**Name of Authors:** Mu'azu Alkali Adamu[1*], Umar Danbade[1],

[1*]Department of Nutrition and Dietetics, School of Health Sciences, Yobe State College of Agriculture, Science and Technology, Gujba PMB 1104, Damaturu, Yobe State, Nigeria.

[*] **E-mail**: muazualkaliadam@gmail.com; Tel.+234(70)383614155

**Keywords:** Proximate analysis, Physicochemical properties, Peanut, Burger

**Highlights:**

- Proximate analysis determines the nutritional composition of peanut burger
- Physicochemical properties assess the physical and chemical quality of peanut burger
- Free fatty acid value indicate fat derioration or hydrolytic rancidity

**Background and objectives:** Peanut (*Arachis hypogea*) is an important legume widely consumed because of its high nutritional value, including protein, healthy fats, vitamins, minerals and dietary fibre. In many developing countries, peanut burgers are popular snacks foods due to their affordability, pleasant taste, and high energy content. Despite their popularity, the nutritional composition and quality characteristics of peanut burgers may vary depending on the variety of peanut used, processing method, ingredient formulation, and frying condition. This study evaluated the proximate composition (moisture, crude protein, crude fibre, lipids, ash and carbohydrates) and physicochemical properties (saponification value, iodine value, acid value, free fatty acid, peroxide value and refractive index) in locally produced peanut burger.

**Materials and Methods:** The methods used for proximate analysis were those of AOAC, 2019. Physicochemical characteristics were determined using GC-MS for fatty acid, in which non-volatile fatty acids were chemically converted to the corresponding volatile methyl esters. The resulting volatile mixture was analysed by gas chromatography. Atomic absorption spectrophotometer (AAS) were used to determine the minerals content in both blanched vegetable samples.

**Result and discussion:** The results showed that the peanut burger contained 40.01% carbohydrates**,** 25.06 % proteins, 20.88 % fats, 9.36 % crude fibre, 4.02 % moisture and 0.66 % ash. The Physicochemical characteristics showed; saponification value of 190.11mgKOH/g, 36.48g/100g iodine value, 4.5mg/KOH/g acid value, 2.7mg/KOH/g free fatty acid, 1.83meq/kg peroxide value and 1.521 refractive index.

**Conclusion and Recommendation:** The nutritive value of peanut burgers from Nigeria can be considered a good source of protein. It can be used to prepare food, as snacks, pastes and used in diets to prevent against some mineral deficiencies. This will aid to fight against malnutrition, especially protein-calorie, malnutrition, leading to better nutrition and health in Nigeria and Africa as a whole.

Further studies should investigate the detailed physicochemical composition of other nuts and oils and the nutritional quality of the proteins and lipids they contain.

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**THEME: DELIVERING BETTER NUTRITION FOR ALL: CONNECTING THE DOTS ACROSS LIFE CYCLE, SYSTEMS, & SECTORS**

**SUB THEME: TRANSFORMING LOCAL FOOD SYSTEMS FOR IMPROVED FOOD SECURITY AND NUTRITION**

# EVALUATION OF PROXIMATE, MICRONUTRIENTS AND SENSORY PROPERTIES OF LOCALLY FORMULATED COMPLEMENTARY FOOD FOR INFANTS AGED 6-24 MONTHS

Quadri, J.A.[1], Alagbe, I.C.[1], Saka, A.B.[2], Adebiyi_Olabode, A.O., Adebimpe, F.M.
[1] Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria
[2] Department of Hospitality and Tourism Management, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria
[2] Department of Consumer, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria
Correspondence: jaquadri@lautech.edu.ng, 2348034939246
**Keywords:** Complementary food; micronutrients; infant nutrition; soybean; sorghum; maize.

## Highlights

- Locally sourced ingredients improved the nutritional quality of complementary foods.
- Sample C (Maize-40%, Sorghum-40%, Crayfish-15%, Sweet potato-2%) had the highest vitamin and mineral concentrations among the formulations.
- Soybean, crayfish, sweet potato, and date fruit enhanced nutrient density.
- Nutrient enrichment enhanced the nutritional composition of the blends, while sensory acceptability varied across formulations.

**Background and Objective:** Adequate complementary feeding is essential for optimal growth and development of infants aged 6–24 months. However, traditional cereal-based complementary foods commonly consumed in developing countries are often deficient in protein and essential micronutrients. This study evaluated the proximate composition, micronutrient content, and sensory properties of locally formulated complementary foods developed from selected indigenous food ingredients (World Health Organization, 2023).

**Methods:** The materials and other ingredients were purchased at New Waso Market, Ogbomoso, Oyo State, Nigeria. Four complementary food formulations were prepared in the form of pap (Sample A contained maize and sorghum (50:50), Sample B maize, sorghum, milk and date (40:40:17:3), Sample C maize, sorghum, crayfish and sweet potato (40:40:15:5), while Sample D contained maize, sorghum, soybean and sweet potato (40:40:18:2)). Standard AOAC (2005) methods were employed to determine the proximate composition, while vitamins (A, $B_9$, $B_{12}$, C, and D) and minerals (calcium, iron, zinc, and iodine) were analyzed using standard analytical procedures. Sensory evaluation was conducted by twenty semi-trained panelists using a 9-point hedonic scale. The results were given as means ± standard deviation of three independent determinations. One-way Analysis of Variance (ANOVA) was used to compare the means, and Duncan's multiple range test was used to separate the means. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) Version 20.0, and significance was taken at a 5% level of probability.

**Results:** Significant differences ($p < 0.05$) were observed among the formulations for proximate composition, micronutrients, and sensory attributes. Sample C exhibited the highest concentrations of vitamins A, C, and D, calcium, iron, and iodine, while Sample D contained the highest levels of vitamins $B_9$ and $B_{12}$, and Sample B had the highest zinc content. Sensory evaluation showed that Sample A recorded the highest scores for appearance, aroma, taste, texture, mouthfeel, and overall acceptability. In contrast, Sample C, despite its superior nutritional quality, received comparatively lower sensory ratings. These findings demonstrate the common

trade-off between enhanced nutritional composition and consumer acceptability in the development of fortified complementary foods (FAO & WHO, 2019).

**Table 1: Proximate and Micronutrient composition of the complementary food samples**

| Parameter | A | B | C | D | p-value |
|---|---|---|---|---|---|
| Moisture (%) | $6.62 \pm 0.01^{b}$ | $5.76 \pm 0.01^{d}$ | $6.93 \pm 0.02^{a}$ | $6.03 \pm 0.01^{c}$ | <0.001 |
| Protein (%) | $16.32 \pm 0.02^{c}$ | $18.22 \pm 0.01^{b}$ | $20.34 \pm 0.02^{a}$ | $21.44 \pm 0.01^{a}$ | <0.001 |
| Crude fibre (%) | $16.47 \pm 0.02^{d}$ | $20.15 \pm 0.02^{b}$ | $25.07 \pm 0.02^{a}$ | $19.96 \pm 0.01^{c}$ | <0.001 |
| Fat (%) | $4.05 \pm 0.02^{c}$ | $2.78 \pm 0.01^{d}$ | $5.32 \pm 0.01^{a}$ | $5.13 \pm 0.01^{b}$ | <0.001 |
| Ash (%) | $0.96 \pm 0.57^{abc}$ | $0.96 \pm 0.02^{c}$ | $2.81 \pm 0.02^{a}$ | $1.38 \pm 0.01^{b}$ | <0.001 |
| Carbohydrate (%) | $50.46 \pm 0.59^{a}$ | $52.13 \pm 0.03^{a}$ | $43.56 \pm 0.02^{c}$ | $46.06 \pm 0.01^{b}$ | <0.001 |
| **Micronutrients** | | | | | |
| Vitamin A (mg/100 g) | $0.23 \pm 0.02^{c}$ | $0.48 \pm 0.01^{a}$ | $0.49 \pm 0.02^{a}$ | $0.43 \pm 0.01^{b}$ | <0.001 |
| Vitamin B9 (mg/100 g) | $4.22 \pm 0.01^{d}$ | $5.18 \pm 0.01^{b}$ | $4.62 \pm 0.01^{c}$ | $6.40 \pm 0.01^{a}$ | <0.001 |
| Vitamin B12 (mg/100 g) | $0.43 \pm 0.01^{d}$ | $0.78 \pm 0.01^{b}$ | $0.53 \pm 0.01^{c}$ | $0.92 \pm 0.02^{a}$ | <0.001 |
| Vitamin C (mg/100 g) | $7.84 \pm 0.01^{b}$ | $5.97 \pm 0.01^{d}$ | $8.54 \pm 0.01^{a}$ | $7.52 \pm 0.02^{c}$ | <0.001 |
| Vitamin D (mg/100 g) | $2.63 \pm 0.02^{c}$ | $3.23 \pm 0.01^{b}$ | $5.37 \pm 1.73^{abc}$ | $4.22 \pm 0.01^{a}$ | <0.001 |
| Calcium (mg/100 g) | $16.94 \pm 0.01^{d}$ | $17.76 \pm 0.01^{b}$ | $19.07 \pm 0.01^{a}$ | $17.34 \pm 0.01^{c}$ | <0.001 |
| Iron (mg/100 g) | $0.26 \pm 0.01^{c}$ | $0.48 \pm 0.01^{b}$ | $1.02 \pm 0.01^{a}$ | $0.48 \pm 0.01^{b}$ | <0.001 |
| Zinc (mg/100 g) | $0.22 \pm 0.01^{c}$ | $0.54 \pm 0.01^{a}$ | $0.29 \pm 0.01^{b}$ | $0.23 \pm 0.01^{c}$ | <0.001 |
| Iodine (mg/100 g) | $2.51 \pm 0.01^{bc}$ | $2.49 \pm 0.01^{c}$ | $2.55 \pm 0.01^{a}$ | $2.52 \pm 0.01^{b}$ | 0.001 |

*Values are mean ± SD of triplicate determinations (n = 3). Within a row, different superscript letters indicate significant difference at $p < 0.05$*

**KEY**: A = (50% maize + 50% sorghum) control, B (40% maize + 40% sorghum +17% groundnut + 3% milk), C (40% maize + 40% sorghum + 15% crayfish + 5% sweet potatoes), D (40% maize + 40% sorghum +18% soybean +2% date).

**Table 2. Sensory attributes of the complementary food samples**

| Parameter | Sample A | Sample B | Sample C | Sample D | p-value |
|---|---|---|---|---|---|
| Appearance | $8.75 \pm 0.55^{a}$ | $8.30 \pm 0.86^{b}$ | $7.90 \pm 1.48^{ab}$ | $8.45 \pm 0.69^{ab}$ | 0.013 |
| Aroma | $7.85 \pm 0.88^{a}$ | $7.50 \pm 1.05^{a}$ | $6.15 \pm 1.42^{b}$ | $7.45 \pm 1.00^{a}$ | <0.001 |
| Taste | $8.00 \pm 1.38^{a}$ | $7.30 \pm 1.22^{a}$ | $5.90 \pm 1.86^{b}$ | $7.25 \pm 1.07^{a}$ | <0.001 |
| Texture | $7.65 \pm 1.14^{a}$ | $6.85 \pm 0.93^{ab}$ | $6.65 \pm 1.42^{b}$ | $7.35 \pm 0.75^{ab}$ | 0.003 |
| Mouthfeel | $7.80 \pm 0.83^{a}$ | $7.40 \pm 1.31^{ab}$ | $5.80 \pm 2.07^{c}$ | $7.05 \pm 1.05^{b}$ | <0.001 |
| Overall acceptability | $8.40 \pm 0.68^{a}$ | $7.70 \pm 0.98^{b}$ | $5.90 \pm 2.02^{c}$ | $7.75 \pm 1.07^{ab}$ | <0.001 |

*Values are mean ± SD of panelist scores (n = 20 for each sensory attribute). Values with different superscript letters within the same row differ significantly at $p < 0.05$; values sharing at least one letter are not significantly different.*

**Conclusion:** Fortification of cereal-based complementary foods with locally available nutrient-dense ingredients significantly enhanced their nutritional quality. Optimizing ingredient combinations to improve sensory acceptability while maintaining high nutrient density could provide affordable, nutritious complementary foods for infants and help reduce childhood malnutrition in resource-limited settings.

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**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title: Two Surveys, Twenty Years Apart: Shifting Food Consumption Patterns, Micronutrient Status, and the Evolving Burden of Malnutrition in Nigeria**

**Name of Authors:** Blessing D. Omole[1]*, hc Sharon O. Oluwaborode[1], Oluwatomiwo E. Ogedengbe[1], Oluwatamilore O. Dunmade[1], Emmanuel C. Ossai[1], Abisola S. Olayinka[1], Grace A. Alao[1], Bosede O. Adebayo-Oke[1], Tolu E. Eyinla[1] and Oluwaseun Ariyo[1]
Affiliation of Authors**:** [1]Department of Human Nutrition & Dietetics, University of Ibadan, Ibadan
***Corresponding Author Email & phone No.:** damilolaomol127@gmail.com,, +234 7048109060
**Keywords:** Dietary diversity, Micronutrient deficiency, Triple burden of malnutrition, Fortification

**Highlights**

- Despite a shifting food system, Nigeria's household food insecurity rose from 40% to 79%**,** while women's dietary diversity remained low at 3.6/10 food groups**.**
- Micronutrient deficiencies remain widespread; however, universal salt iodisation stands out as a rare, highly successful local regulatory intervention

**Background and Objectives:** Nigeria bears one of the heaviest burdens of malnutrition in sub-Saharan Africa; however, nationally representative data on dietary intake remain limited. A functioning local food system should deliver dietary quality and micronutrient adequacy across the life course. This review synthesises findings from two landmark surveys, the Nigeria Food Consumption and Nutrition Survey [1] and the National Food Consumption and Micronutrient Survey [2], to describe changes in food consumption, micronutrient status, and the evolving burden of malnutrition over two decades.

**Materials and Methods:** A narrative comparative review of the two nationally representative surveys was undertaken and triangulated with peer-reviewed literature. The NFCNS covered 6,480 households in 12 states and 72 Local Government Areas, while the NFCMS sampled 9,107 households across all six geopolitical zones and measured micronutrient status using blood and urine biomarkers. Both surveys used 24-hour dietary recall and anthropometry; the 2021 survey additionally assessed diet quality using the Minimum Dietary Diversity for Women (MDD-W). Key indicators were harmonised to enable comparison of staple consumption, diet quality, micronutrient status, food insecurity and anthropometric outcomes.

**Results and Discussion:** Between 2001 and 2021, rice displaced maize as the leading staple and wheat products, noodles and packaged snacks became common, consistent with a nutrition transition [3]. However, the mean MDD-W remained low (3.6 of 10 food groups), and only about 1 in 5 women met the minimum dietary diversity, while household food insecurity rose to nearly 4 in 5 households. Widespread and regionally unequal deficiencies of folate, riboflavin and zinc persisted alongside high anaemia prevalence. Underweight in women declined while overweight and obesity increased, indicating a triple burden of malnutrition. In contrast, sustained salt iodisation successfully eliminated iodine deficiency. These patterns point to structural failures in food distribution, affordability and fortification rather than individual choice.

**Table 1: Key Indicators of Nigeria Women's Food Security and Nutritional Health Over Two Decades**

| Indicator | 2001 | 2021 | Direction |
|---|---|---|---|
| Leading staple | Maize | Rice | Shift |
| Household food insecurity | ~40% | 79% | Worsened |
| Women's dietary diversity (MDD-W) | — | 3.6 / 10 | Inadequate |
| Folate deficiency (pregnant women) | — | 86% | Newly measured |
| Riboflavin deficiency (WRA) | — | 79% | Newly measured |
| Anaemia (pregnant women) | 19.9% | 32% | Worsened |
| Underweight (WRA) | 11.6% | ~7% | Improved |
| Overweight + obesity (WRA) | 19.9% | 23% | Worsened |
| Median urinary iodine (WRA) | Deficient | 292 µg/L | Success |

**Conclusion and Recommendations:** Over the past two decades, Nigeria's food system expanded energy access but failed to ensure dietary quality, leaving persistent hidden hunger and rising rates of overweight. Priority actions should include strengthening pre-conception micronutrient supplementation, expanding fortification beyond formal supply chains, promoting dietary diversification through behaviour-change and food-environment reforms, and investing in continuous nutrition surveillance.

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**Sub-theme:** Transforming local food systems for improved food security and nutrition

**Title:** Exploring the mineral potential of selected under-utilized legumes in northern Nigeria for improved nutrition and sustainable food security

**Name of Authors: ***Ugwu, J.C., Shokunbi, O.S., and Kayode, A.A.A.

**Affiliation of Authors:** Department of Biochemistry, School of Basic Medical Sciences,

Babcock University, Ilishan-Remo, Ogun State, Nigeria

***Corresponding Author's Details: justinaugwu24@gmail.com, +2348080676370

**Keywords:** African yam bean, Bambara nut, Pigeon pea, Under-utilized legumes

**Highlights: -** Under-utilized legumes in Northern Nigeria are rich sources of macro- and microminerals

- Their mineral contents vary widely across the Northern states of Nigeria

**Background and Objective:** Under-utilised legumes are mostly abandoned and neglected by breeders, consumers, researchers, technology providers, policymakers, etc. This reduces their general acceptability and the information available about them. The under-utilized legumes need to be nutritionally characterized for the benefit of human kind, most especially in the developing countries where adequate protein intake is a major problem [1]. African Yam bean seed (AYB), Bambara nut (BMB), and pigeon pea (PGP) have been selected for this research work as they are more commonly encountered, consumed and cultivated as subsistence crops compared to others; albeit with limited national data [2]. This study, therefore, explored the mineral potential of these under-utilized legumes obtained from northern Nigeria.

**Materials and Methods:** The legumes were purchased from six randomly selected sellers in open markets within each of the three geopolitical zones in Northern Nigeria. The mineral elements were analysed in the legumes using an inductively coupled plasma-optical emission spectrophotometer (ICP-OES) according to AOAC (2015.01), after wet digestion. Mean values were compared across zones, and levels of significant difference were established at $p < 0.05$.

**Results and Discussions:** All three legumes are rich in macro- and microminerals across the zones (Table 1). The data showed that pigeon pea is the richest in Ca and potassium, whereas other minerals vary slightly among the three legumes. The Ca content of pigeon pea in this work fell within the reported range [3]. There was no significant difference in the Ca content of the legumes across the northern zones of Nigeria.

**Table 1: Mineral contents (mg/kg dry weight) of selected under-utilized legumes in Northern Nigeria**

| Mineral | Legume | North-West | North-East | North-Central |
|---|---|---|---|---|
| **Ca** | AYB | 332 ± 5.43 [a] | 477 ± 4.79 [a] | 455 ± 41.6 [a] |
| | BMB | 326 ± 17.9 [a] | 243 ± 30.2 [a] | 244 ± 15.4 [a] |
| | PGP | 917 ± 5.27[a] | 987 ± 260 [a] | 1070 ± 64.9[a] |
| **K** | AYB | 5360 ± 17.6[a] | 13900 ± 70.0[b] | 14700 ± 1120[b] |
| | BMB | 15800 ± 52.1 [a] | 13700 ± 882 [a] | 15000 ± 173[a] |
| | PGP | 18000 ± 39.2 [a] | 17900 ± 778 [a] | 17000 ± 658 [a] |
| **Mg** | AYB | 6100 ± 21.1 [a] | 7380 ± 38.8 [a] | 7920 ± 188[a] |
| | BMB | 7460 ± 581[a] | 6790 ± 529[a] | 7170 ± 625[a] |
| | PGP | 6830 ± 16.7 [a] | 7170 ± 1430 [a] | 4920 ± 773 [a] |
| **Na** | AYB | 85.1 ± 1.20[a] | 77.5 ± 0.591[a] | 111 ± 26.0[a] |
| | BMB | 90.7 ± 43.4 [a,b] | 160 ± 53.3[b] | 280 ± 19.3 [c] |
| | PGP | 99.2 ± 1.53[a] | 78.1 ± 11.9[a] | 115 ± 7.04[a] |
| **P** | AYB | 107 ± 1.58[a] | 521 ± 9.54 [b] | 335 ± 191[a] |
| | BMB | 271 ± 136 [a] | 195 ± 67.0 [a] | 126 ± 9.08 [a] |
| | PGP | 134 ± 1.48 [a] | 177 ± 42.6[a] | 414 ± 158 [a] |
| **Cu** | AYB | 5.0 ± 0.274 [a,b] | 9.49 ± 0.473[b] | 8.21 ± 2.37[b] |
| | BMB | 6.19 ± 3.38[a] | 6.45 ± 2.91[a] | 4.10 ± 1.15[a] |
| | PGP | 7.74 ± 0.114[a] | 8.28 ± 2.63 [a] | 13.4 ± 1.35[b] |
| **Fe** | AYB | 38.9 ± 0.524[a] | 103 ± 0.482[b] | 203 ± 30.3[c] |
| | BMB | 47.2 ± 0.572[a] | 84.2 ± 40.1[b] | 104 ± 40.8[b] |
| | PGP | 59.6 ± 0.506 [a] | 98.5 ± 9.61 [a] | 110 ± 32.5 [a] |
| **Mn** | AYB | 11.8 ± 0.117[a] | 24.2 ± 0.209 [b] | 23.2 ± 3.28 [b] |
| | BMB | 19.2 ± 3.28 [a] | 15.6 ± 0.814 [a] | 17.7 ± 1.24 [a] |
| | PGP | 23.5 ± 0.242 [a] | 25.1 ± 7.63 [a] | 19.0 ± 0.35 [a] |

Values represent mean ± standard deviation. N = 6. Values with different superscript on same row are significantly different at $p < 0.05$. AYB = African yam bean seed, BMB = Bambara nut, PGP = Pigeon pea

**Conclusion and Recommendation:** Majority of the legumes analyzed possess minerals that are similar in content across the zones, except for Fe. There is need for more advocacy on the availability and nutritional benefits of these under-utilized legumes in Northern Nigeria, to promote sustainable micronutrient nutrition of the consumers especially within the sub-region.

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**Sub-theme: Transforming local food systems for improved food security and nutrition**

**Title: Impact of anti - slime agents on the nutrient profile and microbiological safety of African giant snail (*Archachatina Marginata*)**

**Authors:** *Ikpemo, K. O.,[1] Nwankwo, J.,[1] Onyeji, G. N.,[2] Beneth-Ugochukwu, I.,[2] and Adeoye-Agomoh, Q. C.[1]

**Affiliation/Institution:** Michael Okpara University of Agriculture, Umudike[1], Alex Ekwueme Federal University Ndufu Alike, Ebonyi State[2]

**Corresponding author's contact:** Ikpemo.kelechi@mouau.edu.ng; +234064182383

**Keywords:** Snail meat, anti–slime agents, microbial quality, nutrient profile

**Background and objective**: African giant snail is a well-known valuable source of low–fat dietary protein with high mucin content known to be zoonotic. This study investigated the impact of alum, citrus lime juice and garri (toasted cassava granules) on the nutrient profile and microbial safety of African giant snail meat.

**Materials and methods:** The snails procured from Orie Ugba market in Umuahia North Local Government Area were manually deshelled, divided into four groups and processed with distilled water (control), alum, citrus lime juice and garri. Nutrient profile and microbial quality were determined using standard methods. Data obtained were analyzed through IBM SPSS Statistics version 29 using Analysis of variance (ANOVA) and Duncan's multiple range test at 95% confidence level ($p<0.05$).

**Results and discussion**:

**Table 1: Proximate composition of the processed snail meat samples**

| S | MC (%) | CP (%) | CF (%) | Fat (%) | Ash (%) | CHO (%) |
|---|---|---|---|---|---|---|
| TCA | $67.13^{c}\pm0.03$ | $17.33^{a}\pm0.02$ | $1.08^{a}\pm0.01$ | $1.39^{c}\pm0.01$ | $5.34^{d}\pm0.01$ | $13.09^{c}\pm0.05$ |
| TAR | $61.36^{d}\pm0.04$ | $13.61^{d}\pm0.01$ | $0.75^{c}\pm0.02$ | $0.84^{d}\pm0.02$ | $5.59^{b}\pm0.01$ | $23.46^{a}\pm0.01$ |
| TLA | $68.46^{a}\pm0.05$ | $15.87^{c}\pm0.01$ | $0.67^{d}\pm0.01$ | $1.66^{a}\pm0.01$ | $5.75^{a}\pm0.02$ | $13.35^{b}\pm0.03$ |
| TGA | $67.96^{b}\pm0.03$ | $17.03^{b}\pm0.01$ | $0.94^{b}\pm0.01$ | $1.45^{b}\pm0.01$ | $5.42^{c}\pm0.01$ | $12.64^{d}\pm0.02$ |

Values are means ± standard deviation of triplicate determinations. Mean values in the same column with different superscript (a-d) are significantly different ($p<0.05$). Key: TCA = Snails washed with water (control group), TAR = Snails washed with alum, TLA = Snails washed with lime, TGA = Snails washed with garri.

**Table 3: The microbial quality of the processed snail meat samples**

| Sample | TBC (CFU/g) | TFC (CFU/g) | TCC (CFU/g) |
|---|---|---|---|
| TCA | $4.77 \times 10^{4a}$ | $3.73 \times 10^{3a}$ | $2.13 \times 10^{1a}$ |
| TAR | $2.35 \times 10^{2b}$ | $4.06 \times 10^{2c}$ | ND |
| TLA | $3.58 \times 10^{2b}$ | $4.22 \times 10^{2c}$ | ND |
| TGA | $4.92 \times 10^{2b}$ | $8.04 \times 10^{2b}$ | $1.34 \times 10^{1b}$ |

Values are means of triplicate determinations. Mean values in the same column with different superscript (a - c) are significantly different ($p<0.05$).Key: TCA = Snail washed with water (control group), TAR = Snail

washed with alum, TLA = Snail washed with citrus lime juice, TGA = Snail washed with garri, TBC = total bacteria count, TFC = total fungal count, TCC = total coliform count, ND = not detected, CFU/g = colony forming units per gram.

**Discussion**

The proximate composition of the snail meat samples is presented in Table 1. Moisture was significantly higher in TLA, indicating increased water retention capacity, which may lead to a softened texture and greater susceptibility to spoilage. All the anti-slime agents significantly reduced protein content. Alum had the greatest effect, followed by citrus lime juice. Alum and citrus lime juice are shown to denature proteins through their coagulation and acidic properties (1). Citrus lime juice increased the fat content of the snail meat, which correlates with improved food palatability. All the anti-slime agents increased the ash content, with citrus lime juice producing the highest levels, indicating a positive impact on the overall mineral content of the snail meat. Ash content of foods is noted to indirectly indicate the amount of mineral present in any food sample. Alum significantly increased the carbohydrate content relatively, likely due to the secondary effect of dehydration. Alum is noted to cause dehydration, which potentially leads to a perceived increase in relative carbohydrate content. Furthermore, both alum and citrus lime juice improved microbial safety by significantly reducing total bacteria count, total fungal count, and eliminating coliforms (Table 2), likely due to their acidic and pH-lowering natures.

**Conclusion:** Overall, citrus lime juice improved microbial safety with a minimal effect on the protein content of the snail meat. However, its minimal application is recommended to avoid excessive protein losses.

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Sub-theme: Transforming Local Food Systems for Improved Food Security and Nutrition

Title: Evaluation of the nutritional composition of plant-based yogurt made from soybeans, coconuts, and rice, fortified with grapes.

Olufadeju, J. O., Osi, A. A., & Sodeinde, J. E

Nutrition and Dietetics Department, The Federal Polytechnic, Ilaro

Olujosh10@gmail.com, +2348123126358

Yoghurt, Plant-based, Fortification

HIGHLIGHTS OF THE FINDINGS

- The research assessed the development of a novel plant-based yogurt from soybean, coconut, and rice fortified with grape.
- The research will show the potential of the formulated yogurt as a nutritious, lactose-free, cholesterol-free, and sustainable functional food.

BACKGROUND AND OBJECTIVES

Plant-based yogurt has emerged as one of the fastest-growing segments of the functional food industry due to increasing consumer demand for sustainable, lactose-free, vegan, and health-promoting alternatives to conventional dairy products (1). The objective of the study is to evaluate the nutritional composition of plant-based yogurt made from soybeans, coconuts, and rice, fortified with grapes.

MATERIALS AND METHOD

Raw materials were procured from a local market and processed into their respective milks using standard methods. The milks were blended at ratios of 100:0:0 (sample A), 80:10:10 (sample B), 70:15:15 (sample C), and 60:20:20 (sample D) to produce four yoghurt samples. The formulated yoghurts were analyzed for proximate composition and micronutrient content using standard analytical methods (2). Data were analyzed using SPSS version 27, and mean differences were determined using Duncan's Multiple Range Test at a 5% level of significance.

RESULTS AND DISCUSSION

The results showed that the moisture content of the yoghurt ranged from 70.03% to 74.60%, with sample A recording the highest value. In contrast, sample D had the highest ash (0.71%), fat (4.09%), crude fiber (0.37%), and carbohydrate (19.37%) contents. Protein content ranged from 4.44% to 5.86%. The protein values were comparable to those reported by (3), whereas the carbohydrate content in the present study was higher than that reported by (3).

Table 1: Proximate analysis of the formulated yoghurt

| Samples | Moisture (%) | Ash (%) | Protein (%) | Fat (%) | Crude fiber (%) | Carbohydrate (%) |
|---|---|---|---|---|---|---|
| A | 74.60±1.00$^{d}$ | 0.59±0.06$^{c}$ | 5.86±1.00$^{d}$ | 2.72±1.00$^{d}$ | 0.24±0.12$^{c}$ | 15.99±1.00$^{c}$ |
| B | 73.48±1.00$^{c}$ | 0.62±0.06$^{c}$ | 5.24±1.00$^{c}$ | 3.14±1.00$^{c}$ | 0.27±0.12$^{c}$ | 17.27±0.12$^{b}$ |
| C | 72.13±1.00$^{b}$ | 0.67±1.00$^{b}$ | 4.82±1.00$^{b}$ | 3.63±1.00$^{b}$ | 0.33±1.00$^{b}$ | 17.93±0.12$^{b}$ |
| D | 70.03±1.00$^{a}$ | 0.71±1.00$^{a}$ | 4.44±1.00$^{a}$ | 4.09±1.00$^{a}$ | 0.37±1.00$^{a}$ | 19.37±1.00$^{a}$ |

Vitamin analysis showed that vitamin A content ranged from 18.40 to 28.91 µg/100 g, with sample D recording the highest value. A similar pattern was observed for vitamins C and E, with maximum values of 2.25 mg and 1.62 mg, respectively, in sample D. Likewise, sample D exhibited the highest mineral concentrations, containing 195.32 mg potassium and 31.23 mg magnesium, values that exceeded those reported by (3).

Table 2: Micronutrient analysis of the formulated Yoghurt

| Samples | Vitamin A (µg/100g) | Vitamin C (mg/100g) | Vitamin E (µg/100g) | Zinc (mg/100g) | Potassium (mg/100g) | Magnesium (mg/100g) |
|---|---|---|---|---|---|---|
| A | 18.40±1.00$^{d}$ | 1.95±1.00$^{d}$ | 0.92±1.00$^{d}$ | 0.95±1.00$^{a}$ | 173.01±1.00$^{d}$ | 27.07±1.00$^{d}$ |
| B | 21.68±1.00$^{c}$ | 2.10±1.00$^{c}$ | 1.14±1.00$^{c}$ | 0.91 ±1.00$^{b}$ | 181.12±1.00$^{c}$ | 28.51±1.00$^{c}$ |
| C | 25.78±1.00$^{b}$ | 2.34±1.00$^{b}$ | 1.37±1.00$^{b}$ | 0.89±1.00$^{c}$ | 188.25±1.00$^{b}$ | 29.93±1.00$^{b}$ |
| D | 28.91±1.00$^{a}$ | 2.52±1.00$^{a}$ | 1.62±1.00$^{a}$ | 0.86±1.00$^{d}$ | 195.32±1.00$^{a}$ | 31.23±1.00$^{a}$ |

## CONCLUSION AND RECOMMENDATION

The study concluded that the formulated plant-based yoghurt has the potential to serve as a health alternative to conventional dairy yoghurt with an appreciable nutritional profile. Further study should be done to determine the microbial content of plant-based yoghurt and compare it to the reference standard.

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**Theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title: Functional, microbiological and nutritional quality of two complementary foods (CF) prepared from pre-processed Pigeon Pea (PP) seeds, fish and vegetables**

**Name of Authors:** *Anaemene D.I.,[1] Kester. T.,[2] Fadupin, G. T[3]

**Affiliation of Authors:** [1]. Nutrition and Dietetics Programme, Bells University of Technology,

*danaemene@bellsuniversity.edu.ng, 08033194217

[2] Department of Agricultural Science and Technology, BUT

[3.] Department of Human Nutrition and Dietetics, University of Ibadan

**Keywords:** underutilised crop, fish, protein quality.

**Highlights**

- Pigeon pea complementary foods resulted in similar length increase as the commercial and casein based foods.
- Fermented pigeon pea (FPP) complementary food improved growth and haematological parameters more than roasted pigeon pea (RPP) food.
- FPP food improved serum calcium, zinc and iron levels of rat more than the RPP.

**BACKGROUND AND OBJECTIVES:** Undernutrition is worse during complementary feeding period and contributes to growth failure, increased morbidity and mortality in children. Tackling undernutrition sustainably entails promoting climate friendly foods. *Cajanus cajan*, an underutilised, indigenous and climate friendly crop, has the potential to improve food security, protein and micronutrient nutrition. This study evaluated the functional, microbiological and nutritional quality of two complementary foods (CF) prepared from FPP and RPP seeds.

**MATERIALS AND METHOD:** Adopting a random block design, 36 weanling rats (30-40g) in six equal groups were acclimatised on 4% casein diet (5 days). Five groups were fed water and 10 g of FPP and RPP diets [1], commercial complementary food (CCF), Casein (protein isolate) and protein-free diets for 21 days while one group was sacrificed at zero day for baseline data. Feed intake, tail length and weight data were used to determine Protein Efficiency Ratios (PER) and growth changes. Biological Value (BV), net protein utilization (NPU), histological, haematological and biochemical parameters were investigated. Data was analysed using ANOVA ($p<0.05$).

**RESULTS AND DISCUSSION:** The water absorption capacities and viscosity values of FPP (320cps; 1.25g/ml) and RPP (322cps; 1.23g/ml) were significantly higher and lower, respectively, than CCF (268cps; 1.34g/ml) values. The microbial counts of the diets were within safe limits. PER value of RPP was lower than the value reported by Ayo et al., [2] Weight gain was higher in FPP (24.1±4.9g) than RPP (+5.8±3.6g) group but lower than those of a similar study (45.88-63.5g) [3]. RPP group had the lowest organ weights. The liver tissue of the rats fed protein-free diet showed necrosis of hepatocytes, moderate vacuolar changes and kupffer cell hyperplasia.

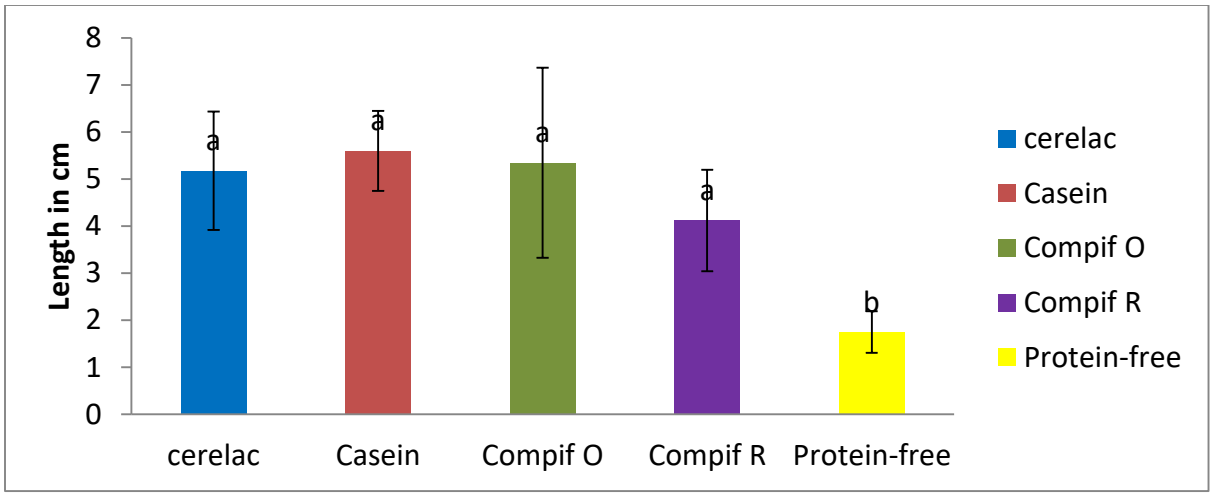



**Figure1.**. Total body length gain of experimental rats fed the test diets.

**Table 1.Protein quality, digestibility parameters of the test diets and Haematological indices**

| Parameters | Cerelac | Casein | Compif O | Compif R | Protein free |
|---|---|---|---|---|---|
| **TD(%)** | 92.28 ± 1.21$^{a}$ | 91.50± 0.35$^{a}$ | 91.70±0.67$^{a}$ | 92.90±0.28$^{a}$ | - |
| **BV(%)** | 85.87±0.64$^{b}$ | 99.50±0.71$^{a}$ | 77.97±0.54$^{c}$ | 47.10±0.16$^{d}$ | - |
| **NPU(%)** | 79.24±0.67$^{b}$ | 91.00±0.57$^{a}$ | 71.50±0.19$^{c}$ | 43.79±0.15$^{d}$ | - |
| **PDCAAS(%)** | 81.76±0.00$^{b}$ | 96.00±0.70$^{a}$ | 68.86±0.68$^{c}$ | 68.45±0.35$^{c}$ | - |
| **PCV (%)** | 34.50$^{b}$± 7.33 | 45.75$^{a}$ ± 2.75 | 29.00$^{b}$ ± 6.16 | 34.25$^{b}$ ± 3.69 | 27.25$^{c}$ ± 2.22 |
| **To**tal chol | 60.25$^{b}$±2.63 | 51.75$^{c}$± 4.35 | 68.75$^{a}$±4.79 | 73.75$^{a}$±4.09 | 36.50$^{d}$**±5.20** |
| **Calcium (mg/100g)** | 10.80$^{ab}$ ± 0.54 | 10.78$^{ab}$ ± 0.90 | 11.00$^{a}$ ± 0.51 | 9.70$^{b}$ ± 0.76 | 8.25$^{c}$± 0.96 |
| **Iron (mg/100g)** | 4.05$^{a}$ ± 0.70 | 3.25$^{a}$ ± 0.72 | 3.33$^{a}$ ± 0.44 | 1.88$^{b}$ ± 0.30 | 1.83$^{b}$ ± 0.42 |
| **Zinc (mg/100g)** | 3.24$^{a}$ ± 0.19 | 2.50$^{b}$ ± 0.53 | 1.58c ± 0.50 | 0.75$^{d}$ ± 0.24 | 1.13$^{cd}$ ± 0.25 |
| **AST (% )** | 41.75$^{a}$ ± 1.26 | 45.50$^{a}$ ± 8.54 | 42.50$^{a}$ ± 3.51 | 43.00$^{a}$ ± 3.83 | 41.25$^{a}$ ± 2.22 |
| **ALT (%)** | 30.25$^{a}$ ± 1.71 | 30.25$^{a}$ ± 4.11 | 31.25$^{a}$ ± 3.30 | 32.00$^{a}$ ± 2.16 | 30.50$^{a}$ ± 6.19 |
| **ALP(%)** | 103.75$^{b}$ ±3.40 | 104.50$^{b}$±2.08 | 110.00$^{b}$ ±12.25 | 106.75$^{b}$ ±8.26 | 130.25$^{a}$ ±2.63 |

True digestibility (TD), Protein digestibility corrected amino acid score (PDCAAS). Assay period= 7 days. PCV= Packed cell volume, AST= Aspartate Amino transferase; ALT=Alanine Amino transferase; ALP= Alkalline phosphatase;

**CONCLUSION AND RECOMMENDATION:** Pigeon pea can be utilised in complementary food production. However, Fermented pigeon pea food performed better than roasted pigeon pea food in terms of nutritional quality and compared favourably with commercial complementary food in growth and haematological effects. It is therefore recommended for use in formulating quality complementary food rather than roasted pigeon pea.

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**Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title:** Development and Quality Evaluation of Flaked Breakfast Cereal from Soaked Acha (Digitaria exilis) and Germinated Pigeon Pea (Cajanus cajan) Composite Flours

**Name of Authors:** *Babalola, K. A.[1], Adeoti, A. O.[2], Alabi, O. A.[2], Elutilo, O. O.[2], Olabiyi, I. V.[2] and Ogunwale, G. O.[2]

**Affiliation of Author:** [1]Department of Chemical Science (Food Science Unit) Fountain University, Osogbo, Osun State

[2]Department Food Science and Technology, The Oke-Ogun Polytechnic, Saki, Oyo State.

*Corresponding author, e-mail: kafayat.babalola@fuo.edu.ng, +234 806 099 4835

**Keywords:** Composite flour, Breakfast flakes, acha, pigeon pea, Germination.

**Highlights:** Composite flour blends were formulated by material balancing to standardize protein and fat content.

- Breakfast flakes were developed from soaked acha and germinated pigeon pea composite flours.
- Flake protein content ranged from 16.46–20.22%, with calcium up to 0.18 mg/100g.

## Background of the Study

Breakfast, meaning "breaks the fast" of the night, is widely regarded as the most important meal of the day, as nutrients consumed at this time are more efficiently utilised than the same quantity eaten at night [1]. Most breakfast products are cereal-based; cereals are low-fat, nutrient-dense foods rich in zinc, phosphorus, calcium, iron and B-vitamins [2]. Cereals such as acha (*Digitaria exilis*) are rich in the sulphur-containing amino acids methionine and cysteine but limited in lysine, whereas legumes such as pigeon pea (*Cajanus cajan*), which contains 20–22% protein, 1.2% fat, 65% carbohydrate and 3.8% ash, are lysine-rich, making cereal–legume blends nutritionally complementary [3]. Despite its nutrient density, acha remains under-utilised owing to its tiny seed size and processing difficulty. Processing operations such as soaking and germination reduce anti-nutritional factors (fibre, phytate, enzyme inhibitors) and can enhance nutrient bioavailability. This study therefore evaluated flaked breakfast cereal produced from blends of soaked acha and germinated pigeon pea flours as a strategy for improving the nutritional composition of breakfast cereals.

## Materials and Methods

Acha grains were soaked in clean water for 0, 6, 12 and 18 h, dried at 50℃ for 48 h, milled, sieved (60-mesh) and packaged. Pigeon pea grains were washed, soaked for 12 h, spread on jute sack to allow for germination for 96 h with intermittent water sprinkling, dried at 50℃ for 72 h, milled and sieved (60-mesh). Composite flours were formulated by material balancing, based on the protein and fat contents of the soaked acha and germinated pigeon pea flours, to achieve target protein and fat contents of 18% and 5% respectively, giving four blends: 31% 0-h acha/69% pigeon pea, 30% 6-h acha/70% pigeon pea, 28% 12-h acha/72% pigeon pea, and 38% 18-h acha/62% pigeon pea. Pasting properties, Proximate, mineral and antioxidant properties of the flour blends were determined using standard procedures, and flakes prepared from the blends were evaluated for sensory attributes using a nine-point Hedonic scale. Data were analysed by ANOVA and significance tested at $\alpha = 0.05$ using SPSS version 22.

## Results and Discussion

Significant ($p<0.05$) differences were observed in the pasting profiles of the flour blends. Peak viscosity ranged from 529.50–692.50 RVU, with the 38% 18-h soaked acha/62% germinated pigeon pea blend recording the highest value, an indicator of good starch water-holding capacity and, by extension, product quality. Flake protein content ranged from 16.46% to 20.22%, highest in the 12-h acha/96-h germinated pigeon pea blend and lowest in the 18-h acha blend, these values were higher than the range of 7 to 13 % reported for flakes made from the blends of wheat, pearl millet and kidney bean flours [4]. Calcium content ranged from 0.15 to 0.18 mg/100g, highest in the 31% 0-h acha/69% pigeon pea and 30% acha/70% pigeon pea blends, important for bone, teeth, muscle and cardiac development. Antioxidant activity (DPPH) ranged from 37.55 to 53.06%, these were in agreement with 25.85 to 62.52 % reported for malted maize, defatted groundnut and sweet orange peel flour blends flakes [5].

**Table 1: Sensory Evaluation of Soaked Acha and Germinated Pigeon Pea Composite Flakes**

| Sample | Taste | Aroma | Appearance | Mouth feel | Texture | Overall acceptability |
|---|---|---|---|---|---|---|
| Commercial flakes | $8.84\pm0.37^{a}$ | $8.66\pm0.48^{a}$ | $8.68\pm0.62^{a}$ | $8.70\pm0.51^{a}$ | $8.80\pm0.40^{a}$ | $8.94\pm0.24^{a}$ |
| 0h acha/pigeon pea | $6.68\pm0.68^{b}$ | $6.32\pm0.91^{b}$ | $6.46\pm0.84^{b}$ | $6.54\pm0.76^{b}$ | $6.70\pm0.74^{b}$ | $7.06\pm0.47^{b}$ |
| 6h acha/pigeon pea | $6.80\pm0.81^{b}$ | $6.42\pm0.70^{b}$ | $6.58\pm0.84^{b}$ | $6.64\pm0.75^{b}$ | $6.62\pm0.83^{b}$ | $6.92\pm0.67^{bc}$ |
| 12h acha/pigeon pea | $6.70\pm0.71^{b}$ | $6.38\pm0.90^{b}$ | $6.28\pm0.76^{b}$ | $6.48\pm0.84^{b}$ | $6.62\pm0.73^{b}$ | $6.76\pm0.62^{c}$ |
| 18h acha/pigeon pea | $6.64\pm0.78^{b}$ | $6.54\pm0.76^{b}$ | $6.38\pm0.88^{b}$ | $6.66\pm0.92^{b}$ | $6.72\pm0.76^{b}$ | $6.92\pm0.60^{bc}$ |

## Conclusion

Flaked breakfast cereal produced from soaked acha and germinated pigeon pea composite flours showed appreciable nutritional qualities. These findings indicate that composite flours from soaked acha and germinated pigeon pea particularly with minimal acha-soaking duration hold promise as raw materials for nutrient-dense, reasonably acceptable breakfast cereal products, offering a viable pathway to improved food security and nutrition.

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**Theme/subtheme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title**: Sensory Evaluation of *Amala* prepared from Yam and Cassava mixed with Sorghum

**Name of Authors:** [*1,2]ORONIRAN O.O, [2]SAMUEL F.O., and [3]OTEGBAYO B.O.

**Affiliation of Authors:** [1]Department of Nutrition and Dietetics, Bowen University

[2]Department of Human Nutrition and Dietetics, University of Ibadan

[3]Department of Food Science and Technology, Bowen University

*email: oluyinkaoroniran@gmail.com

**Key Words:** *Amala,* Yam flour, Cassava flour, Sorghum

**Highlight:** The sorghum blend *amala* samples were rated higher in terms general acceptability.

**BACKGROUND AND OBJECTIVES:**
'*Amala*' made from yam flour is one of the important and widely consumed foods especially among the Yorubas in the South-west region of Nigeria and some other parts of West Africa. It can also be prepared from fermented and sundried cassava or sweet potato flour [1]. Despite the high cost of yam flour, it is still being consumed as is due to its good sensory characteristics or mixed with other locally made flour from cereal such as maize and sorghum for *'amala'* production which may be due to economic reasons in terms of affordability considering the current situation in the country, Nigeria. Hence this study focused on investigating the degree of likeness of *'amala'* made from yam and cassava with sorghum blend flour.

**MATERIALS AND METHODS:**
*Amala* was prepared by traditional method using pure yam or cassava flour (YF, CF), and its blend with sorghum at varying ratios (80:20 -YSF1, CSF1; and 75:25 -YSF2, CSF2). Sensory evaluation to assess the level of likeness and acceptability of *amala* samples was performed by 20 untrained panelists who were familiar with the product. The samples were wrapped in foil and kept in Ziploc bags placed inside a warmer. Panelists rated the *amala* samples for sensory attributes and preference test in terms of colour (very dark brown to very light brown), texture – hand feel (softness to hardness), aroma, taste and overall acceptability using 5point hedonic scale where 1 represents dislike extremely, 2 – dislike, 3 like moderately, 4 – like and 5 like extremely. Data were analyzed using One – way ANOVA (SPSS 27.0 version) and Duncan multiple range test for mean separation.

**RESULTS AND DISCUSSION:** The degree of liking and acceptability measured based on perception on the organoleptic properties of *amala* samples by panelists, indicates that texture was generally liked with the mean values of the sorghum blend *amala* samples higher than the pure *amala* samples (Table 1). Taste and flavour were perceived to be better and more liked in pure yam *amala* sample than its sorghum blend samples while the sorghum blends of cassava *amala* were more liked in both cases. The degree of liking for colour and the general acceptability also reflects that the sorghum blend samples, YSF1, YSF2, CSF1 and CSF2 were more liked than the pure yam *amala* and cassava *amala* samples.

Above all, YSF1 was most preferred out of the yam a*mala* samples and CSF2 out of the cassava *amala* samples. This is comparable with the report [2] that untreated sorghum-cassava at thirty percent inclusion were more preferred in appearance, texture, taste and overall acceptability than pretreated sorghum-cassava *amala* and also pure cassava *amala*. The author further reported that, the pre-gelatinized, fermented and untreated sorghum-

cassava samples had lower ratings compared to *amala* from yam flour but higher than those of cassava flour implying that addition of sorghum to cassava flour improved product characteristics.

**Table 1.** Degree of liking and acceptability of cooked *amala* samples prepared from yam flour, cassava flour and their sorghum flour blends

| | **Yam flour samples** | | | **Cassava flour samples** | | |
|---|---|---|---|---|---|---|
| **Samples** | **YF** | **YSF1** | **YSF2** | **CF** | **CSF1** | **CSF2** |
| **Texture** | 3.67a | 3.79a | 3.50a | 3.55a | 3.85a | 3.85a |
| **Taste** | 4.06a | 3.90a | 3.68a | 3.50a | 3.50a | 3.60a |
| **Aroma** | 3.89a | 3.79a | 3.68a | 3.30a | 3.40a | 3.55a |
| **Colour** | 3.72ab | 4.11a | 4.00a | 3.45b | 4.00a | 4.00a |
| **Overall Acceptability** | 3.72a | 3.95a | 3.84a | 3.60a | 3.75a | 3.95a |

Mean values with same subscript across the same row are not different significantly at $p \geq 0.05$. **Key:** YF – 100%Yam flour, YSF1 – 80% yam flour: 20% sorghum flour, YSF2 – 75% yam flour:25% sorghum flour, CF – 100%Cassava flour, CSF1 – 80% cassava flour:20% sorghum flour, CSF2 – 75% cassava flour:25% sorghum flour

**CONCLUSION AND RECOMMENDATION:** In general, *amala* prepared from composite flour was more acceptable than *amala* prepared purely from yam or cassava, with YSF1 and CSF2 having the highest acceptability scores. These results suggest that composite blend of sorghum with yam or cassava flour for *amala* preparation has good sensory properties and comparable acceptance with the expensive pure yam *amala*.

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**Sub-Theme 1:** Transforming Local Food Systems for Improved Food Security and Nutrition.

**Title:** Watermelon Seed Meal as a Sustainable Alternative to Soyabean in Broiler Diets: Tissue Biochemical Safety and Implications for Local Food Systems.

**Name of Author(s):** *****Adedeji, H.O.[1,2], Ogunbode, S.M.[1], Aboderin, H.O.[1], Balogun, R.A.[1], Alebiosu, A.M.[1], Fajingbesi, A.O.[3], Majolagbe, O.H.[4], Felix A.D.[5] and Olaogun, O.O.[6]

**Affiliation of Author(s):** [1]Department of Chemical Sciences, Biochemistry and Nutrition Unit, Fountain University, Osogbo, Nigeria.

[2]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Nigeria.

[3]Department of Biological Sciences, Fountain University, Osogbo.

[4]Department of Agricultural Education, Lagos State University of Education, Oto/Ijanikin, Nigeria.

[5]Biochemistry Unit, Department of Science Laboratory Technology, Federal Polytechnic, Ede, Osun State, Nigeria.

[6]Premier Feedmill Co. Ltd, Toll Gate, Ibadan, Nigeria

***Corresponding author, e-mail:** hanifatadedeji@gmail.com, +2348145694021.

**Keywords:** Watermelon seed meal; Soyabean replacement; Tissue enzymes; Food security.

**Highlights**

- WMSM safely replaced soyabean up to 40% in broiler diets
- Antioxidant enzymes were tissue-dominant, showing no cell damage
- Birds on 30–40% WMSM had significantly higher weight gain

**BACKGROUND AND OBJECTIVES**

Rising cost of soyabean meal, driven by competition between human and animal use, threatens affordable poultry protein and local food security in Nigeria [1]. Watermelon (*Citrullus lanatus*) seed is an underutilised, protein-rich, antioxidant-containing agricultural by-product with potential as a low-cost soyabean alternative in poultry feed. Adoption at scale, however, requires evidence that it does not compromise bird health or the safety of the resulting meat. This study assessed the effect of graded dietary watermelon seed meal (WMSM) inclusion on liver/kidney biochemical and antioxidant enzyme activities and weight gain in broiler chicks, to inform its use as a sustainable, locally sourced protein source for the poultry feed value chain.

## MATERIALS AND METHOD

One hundred day-old unsexed broiler chicks were allotted to five dietary treatments (D1–D5; 0, 10, 20, 30 and 40% WMSM replacing soyabean) in a completely randomised design, four replicates of five birds each, for three weeks. Blood, liver and kidney samples were collected at the end of the trial. Alkaline phosphatase, alanine and aspartate transaminases, and gamma-glutamyl transferase were assayed as markers of tissue integrity, while catalase, superoxide dismutase, glutathione-S-transferase and reduced glutathione were assayed as antioxidant indices. Weekly weight gain was recorded. Data were analysed by one-way ANOVA and Tukey-Kramer's test ($p<0.05$).

## RESULTS AND DISCUSSION

Liver and kidney tissue-integrity enzymes (ALP, ALT, AST, GGT) were retained predominantly in the tissues rather than the serum across all WMSM levels, indicating that inclusion up to 40% did not compromise hepatic or renal membrane integrity. Antioxidant enzymes (SOD, CAT, GST) were similarly tissue-dominant, supporting the seed's reactive-oxygen-scavenging capacity. Weight gain (Table 1) was significantly ($p<0.05$) higher at 30% and 40% WMSM versus control, while Table 2 shows liver/kidney AST, a sensitive integrity marker, followed a consistent, safe physiological pattern across treatments. These findings align with reports that *Citrullus lanatus* by-products can replace soyabean without detrimental effects on broiler performance [2, 3], supporting WMSM as a viable, locally available protein ingredient for the poultry feed industry.

**Table 1: Weight gain (% of initial weight) of broiler chicks fed graded WMSM diets**

| Diet 1 (0%) | Diet 2 (10%) | Diet 3 (20%) | Diet 4 (30%) | Diet 5 (40%) |
|---|---|---|---|---|
| 42.96±1.27c | 45.50±1.56b | 45.87±2.07b | 48.20±1.25a | 48.27±0.99a |

*Means with different superscripts across a row are significantly different ($p<0.05$).*

**Table 2: Liver and kidney aspartate transaminase (AST) activity (UI/mg protein)**

| Tissue | Diet 1 (0%) | Diet 2 (10%) | Diet 4 (30%) | Diet 5 (40%) |
|---|---|---|---|---|
| Liver | 2.64±0.04d | 3.68±0.01a | 3.35±0.03b | 3.12±0.06c |
| Kidney | 2.75±0.07bc | 3.56±0.06a | 2.29±0.01d | 2.99±0.01b |

*Means with different superscripts across a row are significantly different ($p<0.05$).*

## CONCLUSION AND RECOMMENDATION(S)

Watermelon seed meal can replace soyabean meal in broiler diets at levels up to 40% without adverse effects on liver and kidney biochemical or antioxidant enzyme profiles, while improving weight gain. As an inexpensive, locally available agro-by-product, WMSM offers a practical route to reducing feed costs and diversifying protein sources within the local poultry value chain, with positive implications for food security. Feed millers and poultry farmers should be encouraged to adopt WMSM, and further studies on carcass quality and consumer acceptability of WMSM-fed birds are recommended.

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**THEME:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, & Sectors

**SUB-THEME:** Transforming Local Food Systems for Improved Food Security and Nutrition

# ASSOCIATIONS BETWEEN PROCESSED FOOD CONSUMPTION AND LIPID PROFILES AMONG APPARENTLY HEALTHY ADULTS IN SELECTED LGAS IN IBADAN, OYO STATE, NIGERIA

*Afolami, J.I, Obi, F.I, Bolarinwa A.I, Adeoye, R.O, Adeoye A.D, Akpodonor, O.P, Olotu, A.T, Agidi, O.R, Adetoye, V.I.

Department of Human Nutrition & Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria.

*Corresponding Author: Dr. J.I. Afolami, m.afolami@gmail.com,08135490693

**Keywords:** Processed foods; Lipid profile; Dyslipidaemia; Energy-Weighted NOVA Score

## Highlights

- Higher processed food intake was associated with elevated TC and LDL-C.
- Dyslipidaemia was more prevalent among urban than rural participants. AA
- Processed food consumption was positively associated with serum lipids.

## BACKGROUND AND OBJECTIVES

Cardiovascular diseases (CVDs) and dyslipidaemia are increasing rapidly in Nigeria, driven by urbanization, nutrition transition, and changing food systems. While both processed food and processed foods have been implicated in cardiometabolic risk, it remains unclear whether these dietary exposures exert similar effects on serum lipid profiles, particularly in African populations where processed food are commonly consumed as part of traditional mixed meals. This study investigated the associations between processed food consumption and serum lipid profiles among apparently healthy adults in Ibadan, Nigeria.

## METHODOLOGY

A cross-sectional study was conducted among 79 apparently healthy adults aged 18–40 years recruited from urban (n = 30) and rural (n = 49) communities in selected Local Government Areas of Ibadan, Oyo State, Nigeria. Individuals with known personal or family histories of non-communicable diseases were excluded. Dietary intake was assessed using multiple 24-hour recalls conducted over a period of 5-14 days. Processed food consumption was assessed using Energy-Weighted NOVA Scores. Fasting blood samples were analysed for total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and triglycerides (TG) using enzymatic methods. Associations between dietary exposures and lipid parameters were examined using regression analyses.

## RESULTS AND DISCUSSION

Participants who consumed more processed foods per kcal had higher TC (166 ± 38 mg/dL) and LDL-C (101 ± 33 mg/dL) compared to participants who consumed lower processed foods per kcal (TC = 149 ± 30 mg/dL; LDL-C = 80 ± 23 mg/dL; $p = 0.015$). The overall prevalence of dyslipidaemia was 13%, with nine cases among urban participants and one case among rural participants. Urban participants had significantly higher lipid profile than rural participants especially for TC (196 ± 12.7 mg/dL vs. 140 ± 30.0 mg/dL, $p < 0.0001$); LDL-C

(122 ± 15.6 mg/dL vs. 80 ± 29.0 mg/dL, $p < 0.0001$); and HDL-C (63 ± 5.6 mg/dL vs. 33 ± 11.5 mg/dL, $p < 0.0001$). However, rural participants had significantly higher TG concentrations (135 ± 77.4 mg/dL vs. 57 ± 32.8 mg/dL, $p < 0.0001$). In addition, processed food consumption was positively associated with TC ($p = 0.016$) and LDL-C ($p = 0.004$).

The observed association between processed food consumption and elevated TC and LDL-C suggests that diets containing a higher proportion of processed foods may contribute to early cardiometabolic changes even among apparently healthy adults. The higher prevalence of dyslipidaemia among urban participants may reflect dietary shifts associated with urbanization and changing food environments. These findings reinforce the need to promote healthier dietary practices and support efforts to strengthen local food systems by increasing the availability and consumption of healthier, minimally processed foods [1-4].

**Table 1. Comparison of Lipid Profiles Between Urban and Rural Participants**

| Lipid parameter (mg/dL) | Urban (n = 30) Mean ± SD | Rural (n = 49) Mean ± SD | *p*-value |
|---|---|---|---|
| Total cholesterol (TC) | 196.0 ± 12.7 | 140.0 ± 30.0 | <0.0001 |
| LDL-cholesterol (LDL-C) | 122.0 ± 15.6 | 80.0 ± 29.0 | <0.0001 |
| HDL-cholesterol (HDL-C) | 63.0 ± 5.6 | 33.0 ± 11.5 | <0.0001 |
| Triglycerides (TG) | 57.0 ± 32.8 | 135.0 ± 77.4 | <0.0001 |

## CONCLUSION AND RECOMMENDATION

Higher consumption of processed foods was associated with increased serum lipids, particularly TC and LDL-C, highlighting early cardiometabolic shifts even in apparently healthy young adults. Promoting minimally processed diets and strengthening food-environment policies are essential to mitigate emerging cardiovascular risk in Nigerian communities.

Transforming local food systems to improve the availability, affordability, and consumption of healthier, minimally processed foods should be prioritized alongside nutrition education to improve dietary quality, enhance food security, and reduce the growing burden of diet-related non-communicable diseases in Nigeria.

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**Sub-Theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title**: Evaluation of the Proximate Composition of Food Products Fortified with *Pentadiplandra brazzeana* Root

**Name of Authors:** Ayoola P.O., Promise-Kejeh P.C., *Egbule M.N., Shokunbi O.S.
**Author's Affiliation:** Department of Biochemistry, Babcock University, Ilishan-Remo, Nigeria
***Corresponding Author's Details:** egbulem@babcock.edu.ng, +2348033729604

**Keywords:** Fortification, Functional foods, *Pentadiplandra brazzeana*, Proximate composition

**Highlights: -** *Pentadiplandra brazzeana* root moderately fortified products are more acceptable.

- *P. brazzeana* root fortified snacks showed better proximate compositions.

**Background and Objectives:** *Pentadiplandra brazzeana* (*P. b*) is an underutilized plant with reported health benefits [1]. Food fortification with plant derived ingredients has become an effective strategy for enhanced nutritional quality and functional properties of commonly consumed foods while promoting the usage of underexplored plant resources. However, optimum formulation is needed for enhanced desirable sensory characteristics [2]. Limited scientific information on the incorporation of *P. brazzeana* into food products has restricted its application in the food industry. This study evaluated the sensory acceptability and proximate composition of *P. brazzeana* root fortified food products.

**Materials and Method:** Three snack products (cake, cookies, and chin-chin) were developed using six formulations for each batch: two samples were prepared without fortification; two samples with 2.5% and 5% *P. b* roots; one sample with 2.5% *P. b* roots and 2.5% *Trigonella foenum-graecum* (*T. g*), and one sample with 5% *T. g*. All fortified samples were prepared using oil. Sensory properties were evaluated by 25 semi-trained panelists using a 9-point hedonic scale. Proximate composition was determined using standard analytical methods. Data obtained were analyzed using analysis of variance for differences in means followed by Duncan multiple range post hoc test at $p < 0.05$ level of significance.

**Results and Discussion:** Results showed that all products were generally acceptable, with *P. b* fortified samples exhibiting a better balance between sensory attributes [6.32 ± 1.93 (2.5% *Pb*) and 5.08 ± 1.93 (5% *T. g*) for CA; 5.36 ± 2.06 (5% *P. b*) and 4.76 ± 2.03 (5% *T. g*) for CO; 5.40 ± 1.91 (5% *P. b*) and 4.36 ± 2.02 (5% *T. g*) for CH] and nutritional qualities. The observations suggest that *P. brazzeana* root contributed additional essential nutrients to the products. Thus, supporting reports that plant-based fortification can improve the nutritional profile of food products through increased nutrient density and functional value [2]. The study demonstrates that *P. brazzeana* root possess functional properties for the development of nutrient enhanced snack foods, thus, supporting the use of underexplored indigenous plant resources in food product innovation.

**Table 1: Proximate composition (%) of *P. brazzeana* Baill root formulated products**

CA: Cakes, CO: Cookies, CH: Chin-chin, CHO: Carbohydrate. Sample 1: 0% fortification using fat; Sample 2: 0% fortification; Sample 3: 2.5% *P. b* roots; Sample 4: 5% *P. b roots*; Sample 5: Blend of 2.5% *P. b* and 2.5% *Trigonella foenum-graecum* (*T. g*); Sample 6: 5% *T. g*. Samples 2 and other fortified samples (3 - 6) were processed using oil.

**Conclusion and Recommendations:** *P. brazzeana* root fortification enhanced the nutritional quality of the developed snack products while maintaining acceptable sensory characteristics. Moderate fortification level is recommended for improved acceptability and product quality.

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| Samples | Moisture | Protein | Fat | Ash | Fibre | CHO |
|---|---|---|---|---|---|---|
| **CA1** | $17.91 \pm 0.07^{a}$ | $3.02 \pm 0.06^{b}$ | $29.63 \pm 0.01^{d}$ | $2.24 \pm 0.37^{a, b}$ | $44.35 \pm 0.50^{d}$ | $2.85 \pm 0.13^{a}$ |
| **CA2** | $24.10 \pm 0.21^{b}$ | $3.15 \pm 0.13^{b}$ | $18.92 \pm 0.34^{a}$ | $1.99 \pm 0.01^{a, b}$ | $43.25 \pm 0.35^{c}$ | $8.60 \pm 0.35^{c}$ |
| **CA3** | $25.70 \pm 0.14^{c}$ | $2.94 \pm 0.06^{b}$ | $22.39 \pm 0.08^{c}$ | $2.49 \pm 0.71^{b}$ | $41.70 \pm 0.28^{b}$ | $4.79 \pm 0.99^{b}$ |
| **CA4** | $28.84 \pm 0.14^{e}$ | $1.80 \pm 0.19^{a}$ | $22.41 \pm 0.33^{c}$ | $2.00 \pm 0.00^{a, b}$ | $42.10 \pm 0.57^{b}$ | $2.86 \pm 0.57^{a}$ |
| **CA5** | $35.59 \pm 0.10^{f}$ | $2.80 \pm 0.13^{b}$ | $20.62 \pm 0.33^{b}$ | $1.50 \pm 0.01^{a}$ | $35.60 \pm 0.14^{a}$ | $3.90 \pm 0.15^{a, b}$ |
| **CA6** | $26.15 \pm 0.07^{d}$ | $2.80 \pm 0.37^{b}$ | $22.25 \pm 0.30^{c}$ | $1.75 \pm 0.35^{a, b}$ | $43.85 \pm 0.50^{c, d}$ | $3.21 \pm 0.84^{a}$ |
| **CO1** | $6.79 \pm 0.00^{c}$ | $2.15 \pm 0.06^{a}$ | $35.30 \pm 0.06^{e}$ | $1.25 \pm 0.35^{a}$ | $43.00 \pm 0.71^{b}$ | $11.53 \pm 1.05^{a}$ |
| **CO2** | $3.20 \pm 0.28^{b}$ | $2.72 \pm 0.38^{b, c}$ | $21.24 \pm 0.65^{d}$ | $2.00 \pm 0.00^{b}$ | $42.00 \pm 0.71^{a, b}$ | $28.85 \pm 0.71^{b}$ |
| **CO3** | $1.70 \pm 0.14^{a}$ | $3.11 \pm 0.18^{c}$ | $20.67 \pm 0.04^{c}$ | $1.74 \pm 0.35^{a, b}$ | $42.10 \pm 0.14^{a, b}$ | $30.08 \pm 0.50^{c}$ |
| **CO4** | $3.79 \pm 0.00^{b}$ | $2.54 \pm 0.13^{a, b}$ | $21.87 \pm 0.13^{d}$ | $1.75 \pm 0.36^{a, b}$ | $42.45 \pm 0.64^{a, b}$ | $27.61 \pm 0.28^{b}$ |
| **CO5** | $3.09 \pm 0.71^{b}$ | $2.80 \pm 0.00^{b, c}$ | $11.66 \pm 0.71^{a, c}$ | $1.74 \pm 0.35^{a, b}$ | $42.25 \pm 0.35^{a, b}$ | $38.46 \pm 0.00^{d}$ |
| **CO6** | $8.88 \pm 0.14^{d}$ | $2.93 \pm 0.18^{b, c}$ | $14.63 \pm 0.04^{b}$ | $1.20 \pm 0.01^{a, b}$ | $41.05 \pm 0.78^{a}$ | $30.52 \pm 0.77^{c}$ |
| **CH1** | $9.88 \pm 0.14^{e}$ | $3.59 \pm 0.00^{a}$ | $29.82 \pm 0.14^{e}$ | $1.49 \pm 0.01^{a}$ | $41.95 \pm 0.64^{b, c}$ | $13.28 \pm 0.63^{a}$ |
| **CH2** | $5.09 \pm 0.15^{c}$ | $4.20 \pm 0.50^{a}$ | $18.29 \pm 0.64^{a}$ | $1.49 \pm 0.01^{a}$ | $39.85 \pm 1.20^{a}$ | $31.10 \pm 1.21^{e}$ |
| **CH3** | $2.30 \pm 0.14^{a}$ | $4.86 \pm 0.18^{b}$ | $21.80 \pm 0.33^{c}$ | $1.74 \pm 0.35^{a}$ | $42.10 \pm 0.85^{b, c}$ | $27.21 \pm 0.50^{d}$ |
| **CH4** | $3.89 \pm 0.15^{b}$ | $4.16 \pm 0.06^{a}$ | $21.02 \pm 0.21^{b, c}$ | $1.74 \pm 0.34^{a}$ | $43.70 \pm 0.28^{c}$ | $25.51 \pm 0.05^{c}$ |
| **CH5** | $5.69 \pm 0.71^{c}$ | $4.15 \pm 0.07^{a}$ | $20.21 \pm 0.78^{b}$ | $1.74 \pm 0.35^{a}$ | $40.75 \pm 0.35^{a, b}$ | $27.47 \pm 0.00^{d}$ |
| **CH6** | $7.98 \pm 0.00^{d}$ | $4.86 \pm 0.31^{b}$ | $23.52 \pm 0.31^{d}$ | $1.49 \pm 0.01^{a}$ | $42.40 \pm 0.57^{b, c}$ | $19.76 \pm 0.57^{b}$ |

**Sub-Theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title**: Evaluation of the Proximate Composition of Food Products Fortified with *Pentadiplandra brazzeana* Root

**Name of Authors:** Ayoola P.O., Promise-Kejeh P.C., *Egbule M.N., Shokunbi O.S.
**Author's Affiliation:** Department of Biochemistry, Babcock University, Ilishan-Remo, Nigeria
***Corresponding Author's Details:** egbulem@babcock.edu.ng, +2348033729604
**Keywords:** Fortification, Functional foods, *Pentadiplandra brazzeana*, Proximate composition
**Highlights: -** *Pentadiplandra brazzeana* root moderately fortified products are more acceptable.

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**Table 1: Proximate composition (%) of *P. brazzeana* Baill root formulated products**

| Samples | Moisture | Protein | Fat | Ash | Fibre | CHO |
|---|---|---|---|---|---|---|
| **CA1** | 17.91 ± 0.07$^{a}$ | 3.02 ± 0.06$^{b}$ | 29.63 ± 0.01$^{d}$ | 2.24 ± 0.37$^{a, b}$ | 44.35 ± 0.50$^{d}$ | 2.85 ± 0.13$^{a}$ |
| **CA2** | 24.10 ± 0.21$^{b}$ | 3.15 ± 0.13$^{b}$ | 18.92±0.34$^{a}$ | 1.99 ± 0.01$^{a, b}$ | 43.25 ± 0.35$^{c}$ | 8.60 ± 0.35$^{c}$ |
| **CA3** | 25.70 ± 0.14$^{c}$ | 2.94 ± 0.06$^{b}$ | 22.39 ± 0.08$^{c}$ | 2.49 ± 0.71$^{b}$ | 41.70 ± 0.28$^{b}$ | 4.79±0.99$^{b}$ |
| **CA4** | 28.84 ± 0.14$^{e}$ | 1.80 ± 0.19$^{a}$ | 22.41 ± 0.33$^{c}$ | 2.00 ± 0.00$^{a, b}$ | 42.10 ± 0.57$^{b}$ | 2.86 ± 0.57$^{a}$ |
| **CA5** | 35.59 ± 0.10$^{f}$ | 2.80 ± 0.13$^{b}$ | 20.62 ± 0.33$^{b}$ | 1.50 ± 0.01$^{a}$ | 35.60 ± 0.14$^{a}$ | 3.90 ± 0.15$^{a, b}$ |
| **CA6** | 26.15 ± 0.07$^{d}$ | 2.80 ± 0.37$^{b}$ | 22.25 ± 0.30$^{c}$ | 1.75 ± 0.35$^{a, b}$ | 43.85 ± 0.50$^{c, d}$ | 3.21 ± 0.84$^{a}$ |
| **CO1** | 6.79 ± 0.00$^{c}$ | 2.15 ± 0.06$^{a}$ | 35.30 ± 0.06$^{e}$ | 1.25 ± 0.35$^{a}$ | 43.00 ± 0.71$^{b}$ | 11.53 ± 1.05$^{a}$ |
| **CO2** | 3.20 ± 0.28$^{b}$ | 2.72 ± 0.38$^{b, c}$ | 21.24 ± 0.65$^{d}$ | 2.00 ±0.00$^{b}$ | 42.00 ± 0.71$^{a, b}$ | 28.85 ± 0.71$^{b}$ |
| **CO3** | 1.70 ± 0.14$^{a}$ | 3.11 ± 0.18$^{c}$ | 20.67±0.04$^{c}$ | 1.74 ± 0.35$^{a, b}$ | 42.10 ± 0.14$^{a, b}$ | 30.08 ± 0.50$^{c}$ |
| **CO4** | 3.79 ± 0.00$^{b}$ | 2.54 ± 0.13$^{a, b}$ | 21.87 ± 0.13$^{d}$ | 1.75 ± 0.36$^{a, b}$ | 42.45 ± 0.64$^{a, b}$ | 27.61 ± 0.28$^{b}$ |
| **CO5** | 3.09 ± 0.71$^{b}$ | 2.80 ± 0.00$^{b, c}$ | 11.66 ± 0.71$^{a, c}$ | 1.74 ± 0.35$^{a, b}$ | 42.25 ± 0.35$^{a, b}$ | 38.46 ± 0.00$^{d}$ |
| **CO6** | 8.88 ± 0.14$^{d}$ | 2.93 ± 0.18$^{b, c}$ | 14.63 ± 0.04$^{b}$ | 1.20 ± 0.01$^{a, b}$ | 41.05 ± 0.78$^{a}$ | 30.52 ± 0.77$^{c}$ |
| **CH1** | 9.88 ± 0.14$^{e}$ | 3.59 ± 0.00$^{a}$ | 29.82 ± 0.14$^{e}$ | 1.49 ± 0.01$^{a}$ | 41.95 ± 0.64$^{b, c}$ | 13.28 ± 0.63$^{a}$ |
| **CH2** | 5.09 ± 0.15$^{c}$ | 4.20 ± 0.50$^{a}$ | 18.29 ± 0.64$^{a}$ | 1.49 ± 0.01$^{a}$ | 39.85 ± 1.20$^{a}$ | 31.10 ± 1.21$^{e}$ |
| **CH3** | 2.30 ± 0.14$^{a}$ | 4.86 ± 0.18$^{b}$ | 21.80 ± 0.33$^{c}$ | 1.74 ± 0.35$^{a}$ | 42.10 ± 0.85$^{b, c}$ | 27.21 ± 0.50$^{d}$ |
| **CH4** | 3.89 ± 0.15$^{b}$ | 4.16 ± 0.06$^{a}$ | 21.02 ± 0.21$^{b, c}$ | 1.74 ± 0.34$^{a}$ | 43.70 ± 0.28$^{c}$ | 25.51 ± 0.05$^{c}$ |
| **CH5** | 5.69 ± 0.71$^{c}$ | 4.15 ± 0.07$^{a}$ | 20.21 ± 0.78$^{b}$ | 1.74 ± 0.35$^{a}$ | 40.75 ± 0.35$^{a, b}$ | 27.47 ± 0.00$^{d}$ |
| **CH6** | 7.98 ± 0.00$^{d}$ | 4.86 ± 0.31$^{b}$ | 23.52± 0.31$^{d}$ | 1.49 ± 0.01$^{a}$ | 42.40 ± 0.57$^{b, c}$ | 19.76 ± 0.57$^{b}$ |

CA: Cakes, CO: Cookies, CH: Chin-chin, CHO: Carbohydrate. Sample 1: 0% fortification using fat; Sample 2: 0% fortification; Sample 3: 2.5% *P. b* roots; Sample 4: 5% *P. b roots*; Sample 5: Blend of 2.5% *P. b* and 2.5% *Trigonella foenum-graecum* (*T. g*); Sample 6: 5% *T. g*. Samples 2 and other fortified samples (3 - 6) were processed using oil.

**Conclusion and Recommendations:** *P. brazzeana* root fortification enhanced the nutritional quality of the developed snack products while maintaining acceptable sensory characteristics. Moderate fortification level is recommended for improved acceptability and product quality.

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**Theme/Sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition

**Title: Post-Harvest Loss Reduction as an Entrepreneurial Opportunity for Improving Food Supply in Lagos State**

**Name of Author:** *Abusomwan, V.I.[1]

**Affiliation of Author(s):** [1]Department of Technology and Vocational Education, University of Lagos.

*Corresponding author, e-mail: vabusomwan@unilag.edu.ng, +234 803 304 1396

**Keywords:** Post-harvest loss reduction, entrepreneurship, food supply, food security.

**Highlights**

- Poor handling, storage, and transport caused major post-harvest losses
- Cold storage, drying, and packaging enterprises reduced spoilage
- Post-harvest enterprises supported jobs, value addition, and distribution

**BACKGROUND AND OBJECTIVES:**
Food supply in Lagos State is increasingly under pressure from post-harvest losses in the handling, storage, movement, and marketing of perishable food items, reducing the quantity and quality of food available to consumers and weakening the income potential of actors across the food chain. This study therefore, examined post-harvest loss reduction as an entrepreneurial pathway for strengthening food supply in Lagos State, focusing on the practical business activities, storage, processing, packaging, preservation, and transport services, through which food waste can be limited and the flow of food into the market improved.

**MATERIALS AND METHOD:**
A descriptive survey design was employed. Respondents were drawn from farmers, food processors, traders, transporters, and operators of post-harvest service businesses in selected areas of Lagos State. Data were obtained using a structured questionnaire designed to capture information on common sources of post-harvest loss, existing loss-reduction practices, entrepreneurial prospects, and the perceived effects of these activities on food supply. Data were analysed using descriptive statistics.

**RESULTS AND DISCUSSION:**
Findings showed that the major causes of post-harvest losses included poor handling methods, insufficient storage facilities, weak transportation systems, and limited access to preservation technologies, consistent with similar findings reported in the literature [1,3]. Entrepreneurial ventures in cold storage, drying, food packaging, aggregation, and processing were effective in reducing spoilage and improving the availability of food in urban markets, in line with interventions such as solar dryers, decentralized processing hubs, and subsidized cold storage reported elsewhere [2]. Post-harvest loss reduction was further found to support employment creation, value addition, shelf-life extension, and more reliable food distribution. However, the growth of such enterprises was hindered by inadequate financing, high operating costs, poor infrastructure, and limited technical skills, echoing similar constraints identified in prior studies [2].

**Table 1: Post-Harvest Enterprises and Their Contributions to Job Creation, Value Addition, and Distribution**

| S/N | Statement | Mean | SD | Decision |
|---|---|---|---|---|
| 1 | Post-harvest enterprises create employment opportunities for people involved in sorting, grading, cleaning, and handling agricultural produce. | 3.31 | .73 | Agreed |
| 2 | Processing activities such as drying, milling, juicing, fermenting, and packaging contribute to value addition in agricultural products. | 3.40 | .64 | Agreed |
| 3 | Storage enterprises such as warehouses, silos, and cold rooms support job creation and reduce spoilage after harvest. | 3.29 | 70 | Agreed |
| 4 | Transport and logistics services in the post-harvest sector improve the distribution of agricultural produce from farms to markets. | 3.43 | .71 | Agreed |
| 5 | Small-scale food processing enterprises provide income-generating opportunities for rural households and entrepreneurs. | 3.44 | .68 | Agreed |
| 6 | Packaging and labelling enterprises improve product quality, market appeal, and shelf life of agricultural produce. | 3.33 | .69 | Agreed |
| 7 | Post-harvest enterprises help reduce losses by protecting produce from damage, contamination, and spoilage during storage and movement. | 3.28 | .70 | Agreed |
| 8 | Agro-processing businesses contribute to market expansion by converting raw produce into higher-value products for local and export markets. | 3.40 | .64 | Agreed |
| 9 | The growth of post-harvest enterprises stimulates indirect employment in marketing, machinery maintenance, retailing, and logistics. | 3.39 | .65 | Agreed |
| 10 | Post-harvest enterprises strengthen the agricultural value chain by linking producers, processors, distributors, and consumers more efficiently. | 3.51 | .63 | Agreed |

Data on table 1 reveals that, the ten items had a mean ranging from 3.28 to 3.51 which were above the cutoff point of 2.50 which indicates that the respondents agreed to all the items stated that post-harvest enterprise can contributes to job creation, value addition, and distribution. The standard deviation of all the ten items ranging from 63 to .73 portrays that the respondents mean and opinions were not too far from one another.

## CONCLUSION AND RECOMMENDATION(S):

Post-harvest loss reduction is not only a food security measure but also a viable entrepreneurial opportunity in Lagos State. Targeted support for small and medium-scale post-harvest enterprises is recommended, through access to credit, technical training, improved storage infrastructure, and enabling policy measures.

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**Sub-theme**: Transforming Local Food Systems for Improved Food Security and Nutrition

**Title**: Micronutrient Composition and Food Security Potential of *Cissus populnea* Stem: An Underutilized Indigenous Food Resource in Benue State, Nigeria

**Names of Authors**: *Ekwu, M. T.[1], Ukam, N. U.[2] & Ekpenyong, E. I.[3]

**Affiliation of Authors:** [1]Department of Biochemistry, University of Calabar, Cross River State

[2]Department of Human Nutrition and Dietetics, University of Calabar, Cross River State.

[3]Department of Home Economics Education, University of Education and Entrepreneurship, Akamkpa, Cross River State.

**Corresponding author email**: emarvistiti@gmail.com; Phone: 07083607362

**Keywords**: *Cissus populnea*, Indigenous food, Micronutrients, Food security

**Highlights**:

- *Cissus populnea* stem contains essential antioxidant vitamins and B-complex vitamins.
- The stem provides important minerals including magnesium, zinc, calcium and phosphorus.
- Promoting indigenous foods such as *Cissus populnea* can improve dietary diversity and support food and nutrition security.

## BACKGROUND AND OBJECTIVES:

Indigenous food resources play an important role in strengthening local food systems and improving dietary quality, yet many remain underutilized despite their nutritional value [1]. *Cissus populnea* (*Okoho*), traditionally consumed by the Idoma people of Benue State as a soup thickener, is one such indigenous food [2; 3]. This study evaluated the micronutrient composition of *Cissus populnea* stem to provide evidence for its nutritional importance and potential contribution to food security and improved nutrition.

## MATERIALS AND METHODS

Fresh stems of Cissus populnea were collected and processed using standard laboratory procedures. Vitamin and mineral analyses were carried out using AOAC [4] standard analytical methods. Data were analyzed in triplicate and expressed as mean ± standard deviation. Significant differences among nutrient concentrations were determined at $P < 0.05$.

## RESULTS AND DISCUSSION

The stem contained appreciable concentrations of antioxidant vitamins, with Vitamin A recording the highest value (156.43 ± 0.01 µg/100 g), followed by Vitamin E (1.11 ± 0.07 µg/100 g) and Vitamin C (0.76 ± 0.03 µg/100 g). Among the B-complex vitamins, Vitamin $B_6$ was the predominant vitamin (132.10 ± 0.07 µg/100 g), while Vitamins $B_3$, $B_1$, $B_2$ and $B_{12}$ were also detected. Mineral analysis showed that magnesium (0.22 ± 0.004)%, zinc (0.12 ± 0.02)%, calcium (0.11 ± 0.009)%, manganese (0.11 ± 0.02)% and phosphorus (0.11 ± 0.05)% were present in appreciable amounts, with lower concentrations of iron, sodium and copper. These findings demonstrate that Cissus *populnea* stem is a valuable source of essential micronutrients capable of supporting dietary diversity and improving nutritional intake.

## CONCLUSION AND RECOMMENDATIONS

*Cissus populnea* stem is a promising indigenous food resource with valuable micronutrient composition. Its promotion and wider utilization could contribute to transforming local food systems, improving dietary diversity and reducing micronutrient deficiencies [5]. Increased cultivation, value addition and nutrition education on the use of this indigenous plant are therefore recommended.

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**SUB-THEME: TRANSFORMING LOCAL FOOD SYSTEMS FOR IMPROVED FOOD SECURITY AND NUTRITION**

**TITLE**: NUTRITIONAL COMPOSITION, ANTINUTRITIONAL FACTORS, MINERAL CONTENT AND PHYTOCHEMICAL PROFILE OF *DANIELLIA OLIVERI* SEEDS.

**NAME OF AUTHORS**: *Ahmad A.[1] & Abubakar H. A[2].

**AFFILIATION OF AUTHORS**: [1]Department of Nutrition and Dietetics, Katsina State College of Health Sciences and Technology, Katsina.

[2]Department of Nutrition and Dietetics, College of Science and Technology, Hassan Usman Katsina Polytechnic, Katsina.

*Corresponding Author: ahmadabdullahisaulawa08@gmail.com +2347060476634

**KEYWORDS**: *Daniellia oliveri*, mineral, nutritional, phytochemicals.

**HIGHLIGHTS:**

- High carbohydrate (58.83%) and protein (23.27%), shows its nutritional potential.
- Rich in essential minerals, particularly potassium, calcium, and magnesium.
- Presence of phytochemicals, support its potential use as a functional food.

**BACKGROUND AND OBJECTIVES:**

Underutilized indigenous plant resources have gained increasing attention due to their potential contributions to food security, dietary diversification, and improved nutrition. *Daniellia oliveri* (Rolfe) Hutch. & Dalziel is a multipurpose tree species widely distributed across the savannah regions of West Africa and traditionally utilized for food and medicinal purposes [3, 4]. Although the seeds are consumed in some parts of Northwestern Nigeria, scientific information on their nutritional and phytochemical properties remains limited. This study evaluated the nutritional composition, antinutritional factors, mineral content, vitamin C, and phytochemical constituents of *Daniellia oliveri* seeds.

**MATERIALS AND METHOD:**

Seeds of *Daniellia oliveri* were purchased from a local market in Birnin Kebbi, Kebbi State, Nigeria. Standard analytical procedures [2] were employed to determine proximate composition, antinutritional factors, vitamin C content, mineral composition, and qualitative phytochemical constituents. All analyses were conducted in triplicate, and results were expressed as mean ± standard deviation.

**RESULTS AND DISCUSSION:**

The proximate composition showed moisture content of 9.43 ± 0.23%, ash 4.33 ± 0.23%, crude protein 23.27 ± 0.21%, crude fibre 6.13 ± 0.06%, crude fat 8.00 ± 0.20%, and carbohydrate 58.83 ± 0.25%. Antinutritional factors were present at relatively low levels, with phytate, oxalate, and trypsin inhibitor values of 2.36 ± 0.78, 0.00602 ± 0.0017, and 0.318 ± 0.005, respectively. Vitamin C content was 9.33 ± 0.06 mg/100 g. Mineral analysis revealed potassium as the most abundant mineral (878.33 ± 5.51 mg/100 g), followed by calcium (227.00 ± 16.00 mg/100 g), magnesium (207.00 ± 6.56 mg/100 g), iron (13.00 ± 0.00 mg/100 g), and zinc (4.33 ± 0.58 mg/100 g). Qualitative phytochemical screening indicated the presence of cardiac glycosides, saponins, phenolic compounds, tannins, steroids, carbohydrates, flavonoids, and terpenoids, while alkaloids and

anthraquinones were absent. The presence of phenolic compounds and flavonoids suggests potential antioxidant activity [1].

## CONCLUSION AND RECOMMENDATIONS:

The findings demonstrate that *Daniellia oliveri* seeds possess considerable nutritional value, characterized by high carbohydrate content, substantial protein levels, essential minerals, and beneficial phytochemicals. The relatively low concentrations of antinutritional factors further support their suitability for human consumption. These results highlight the potential of *Daniellia oliveri* seeds as an underutilized food resource that could contribute to improved food and nutrition security in Northwestern Nigeria. Further studies should investigate the nutrient bioavailability, functional properties, and health-promoting potential of *Daniellia oliveri* seeds. In addition, appropriate processing techniques and food product development strategies should be explored to enhance their utilization and contribution to food and nutrition security.

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**SUB THEME 1: Transforming Local Food Systems for Improved Food Security and Nutrition**
**Title:** Bioavailability of Total Carotenoid in Co-Fermented and Co-Milled Yellow Quality Protein Maize and Carrot Blend Using Wistar Rat.

**Name of Author (s):** *Ukeme, U.E.[1], Oladeji, B.S.[2], and Udensi, F.O.[3]
**Affiliation of Author (s):**
[1]Department of Biochemistry (Nutrition & Food Science), University of Calabar, Nigeria
[2]Department of Food Science & Technology, University of Calabar, Nigeria
[3]Department of Human Nutrition and Dietetics, University of Calabar, Nigeria

***Corresponding author:** Ukeme, U.E., Email: debys968@gmail.com, +2348036211189

**Keywords:** Provitamin A Bioavailability, Co-Milling, Co-Fermentation, Biofortification.

**Highlights**

- Co-milling resulted in superior systemic carotenoid bioavailability (61.53%) compared to co-fermentation (53.84%).
- The food matrix of an 80:20 yellow Quality Protein Maize (QPM)-carrot blend retained identical carotenoid content (0.13 mg/100g) regardless of processing method.
- Co-milling offer reliable food-processing strategy for carotenoid delivery in biofortification programs.

**BACKGROUND AND OBJECTIVES:**
Vitamin A deficiency (VAD) remains a critical nutritional challenge across sub-Saharan Africa, with an estimated 250 million preschool children affected globally [1]. Provitamin A carotenoids from plant-based foods offer a sustainable solution; however, their bioavailability is strongly conditioned by the food matrix and processing methodology [2]. Yellow Quality Protein Maize (QPM), biofortified with beta-carotene, and carrots represent regionally accessible foods with potential for complementary food interventions [3]. While fermentation and milling are common processing techniques, their comparative effect on carotenoid bioavailability from a QPM-carrot blend has not been systematically compared for *in vivo* total carotenoid. Therefore, this study aimed to evaluate the bioavailability of total carotenoids in co-milled and co-fermented blends of yellow Quality Protein Maize and carrots by fecal balance and whole plasma methods using Wistar rats as a model organism

**MATERIALS AND METHOD:**
An 80:20 blend of yellow QPM and carrot was prepared and divided into two portions. One portion was co-fermented (CFS) for 72 hours, while the other was co-milled (CMS) into a fine powder, following established method [3]. Twelve adult-male Wistar rats (approx. 120 g each) were acclimatized for three days and then divided into two dietary groups (n=6): Group A (fed CFS) and Group B (fed CMS), each receiving 50 g/day for five days. Total carotenoid content in the food, fecal, and plasma samples was quantified spectrophotometrically at 450 nm.

**RESULTS AND DISCUSSION:**
Both processing methods yielded identical food-phase total carotenoid content (0.13 mg/100 g), confirming that observed inter-group differences were due to processing methodology alone. Co-milled rats exhibited modest, stable body weight dynamics (net gain: +0.46% by Day 5), while co-fermented rats experienced an initial decline of 4.85% on Day 2 before recovering to a net gain of 1.39%, consistent with fermentation-induced digestive adaptation [4] (Figure 1). Fecal carotenoid excretion ranged from 15.36 to 38.46% (CMS) and 15.38 to 30.76% (CFS). Decisively, whole plasma analysis revealed higher systemic carotenoid retention in the co-milled group (0.08 mg/100 ml; 61.53% absorption) relative to the co-fermented group (0.07 mg/100 ml; 53.84% absorption), indicating superior bioavailability by this clinically relevant endpoint. The mechanistic advantage of co-milling

is attributable to more uniform mechanical disruption of chromoplast membranes, which facilitates carotenoid solubilization and intestinal uptake [5].

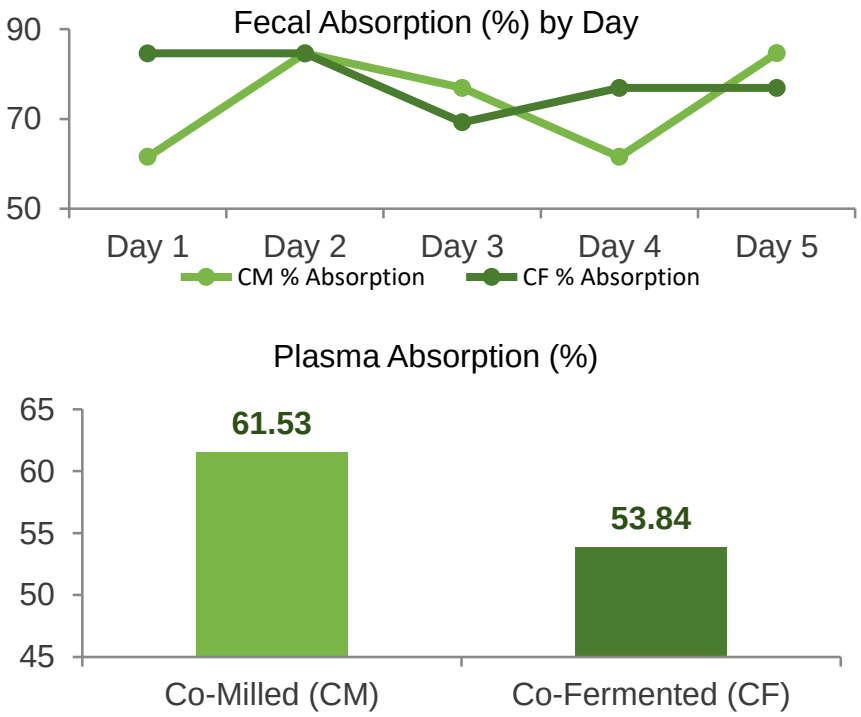



**Figure 1**: Comparative absorption analysis Fecal Absorption (%) by Day and Plasma Absorption (%)

**CONCLUSION AND RECOMMENDATION(S):**

This study demonstrates that while co-fermentation confers early absorptive advantages, co-milling produces more consistent and superior systemic carotenoid bioavailability from QPM-carrot blends. Co-milled blends offer a more reliable food-processing strategy for carotenoid delivery. We recommend the inclusion of co-milled QPM-carrot blends in complementary food programs targeting VAD and underscore the importance of processing method selection in biofortified crop interventions.

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# PROXIMATE COMPOSITION, VITAMIN COMPOSITION AND SENSORY EVALUATION OF TIGERNUT DRINK AND INSTANT TIGERNUT DRINK POWDER

**Ezenwa, H.C.[1], Okiyi, C.E.[1], Ifetoye, O. P.[1] Ezugwu, V.C.[1], Nnorom, O.M.[1], Nwakwuo, D.C.[1], Uzoukaibe, B.C.[1], Onuoha, B.O.[1], Amusi, M.U.[1]**

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria.

sallypifetoye@gmail.com; 08144187209

**Keywords:** Tigernut; Instant beverage powder; Proximate composition; Vitamins; Sensory evaluation.

## Highlights

- A composite instant tigernut drink powder was developed by dehydrating a locally formulated tigernut beverage containing dates, coconut, ginger and cloves to improve convenience, portability and storage stability.
- The reconstituted powder showed higher protein, fat, ash, riboflavin and vitamin E than the fresh drink, while vitamins $B_1$ and C showed no significant differences among samples.
- Fresh tigernut drink was most preferred sensorially, although the reconstituted powder remained acceptable.

**BACKGROUND AND OBJECTIVES:** Fresh tigernut drink is nutritious but highly perishable because of its high moisture content, whereas dehydration can improve shelf stability, convenience and utilization of locally produced tigernut [1,2]. The present study further explored value addition through a composite instant beverage powder containing tigernut with locally used dates, coconut, ginger and cloves, thereby providing a portable form that can extend use of tigernut beyond immediate consumption. The study compared the proximate and vitamin composition and sensory attributes of fresh tigernut drink and instant tigernut drink powder.

**MATERIALS AND METHODS:** An experimental study used 700 g yellow tigernuts to prepare fresh and composite beverages with dates, coconut, ginger, cloves and water. The composite powder was dehydrated at 60°C for 48 h, milled, sieved (500 µm), packaged and reconstituted in cold water. Proximate and vitamin analyses followed AOAC procedures [3], while 40 semi-trained panelists assessed sensory attributes using a 9-point hedonic scale. Data were analysed in duplicates using one-way ANOVA and Duncan's Multiple Range Test in SPSS 27.0 at $p < 0.05$.

**RESULTS AND DISCUSSION:** Proximate composition differed significantly ($p < 0.05$) among samples. $T_2$ had higher protein (9.51%), fat (10.21%) and ash (2.07%) than $T_1$, while $T_1$ had the highest moisture (82.91%). Carbohydrate was calculated by difference and energy using Atwater factors. Vitamins $B_1$ and C did not differ significantly, whereas $B_2$ and E differed significantly; $T_2$ recorded the highest $B_2$ (1.56 mg/100 g) and E (2.30 mg/100 g). The lower moisture of $T_2$ and its retention and increase of selected nutrients support its potential as a value-added, portable tigernut product, although these results do not establish overall nutritional superiority.

**Table 1: Proximate and vitamin composition of tigernut drink and instant tigernut drink powder (Mean ± SD)**

| Parameter | $T_1$ Fresh | $T_2$ Instant powder | $T_3$ Control |
|---|---|---|---|
| Moisture (%) | 82.91±0.04[a] | 76.61±0.06[c] | 81.83±0.05[b] |
| Protein (%) | 3.07±0.03[c] | 9.51±0.04[a] | 3.64±0.03[b] |
| Fat (%) | 5.15±0.04[c] | 10.21±0.02[a] | 5.76±0.04[b] |
| Fibre (%) | 0.03±0.02[a] | 0.04±0.01[a] | 0.02±0.00[a] |
| Ash (%) | 1.48±0.68[a] | 2.07±0.04[a] | 1.23±0.04[a] |
| Carbohydrate (%)† | 7.36[a] | 1.56[b] | 7.52[a] |
| Energy (kcal/100 g)† | 88.07[b] | 136.17[a] | 96.48[b] |
| Vitamin $B_1$ (mg/100 g) | 0.47±0.04[a] | 0.58±0.04[a] | 0.51±0.04[a] |
| Vitamin $B_2$ (mg/100 g) | 1.24±0.02[c] | 1.56±0.03[a] | 1.37±0.05[b] |
| Vitamin C (mg/100 g) | 64.77±0.05[a] | 64.06±1.36[a] | 64.96±0.06[a] |
| Vitamin E (mg/100 g) | 1.62±0.04[b] | 2.30±0.06[a] | 1.69±0.02[b] |

Different superscripts within a row indicate significant difference ($p < 0.05$).

Sensory evaluation showed that $T_1$ recorded the highest overall acceptability (7.55 ± 1.16), while $T_2$ scored 6.90 ± 1.08 and remained acceptable. $T_2$ was statistically comparable with $T_1$ for aroma, taste, mouth-feel and overall acceptability, although its appearance score was lower. This indicates that dehydration affected some sensory attributes but did not eliminate acceptability of the reconstituted product.

**Table 2: Sensory evaluation of tigernut drink and instant tigernut drink powder (Mean ± SD)**

| Attribute | $T_1$ Fresh | $T_2$ Instant powder | $T_3$ Control |
|---|---|---|---|
| Appearance | 7.55±1.67[a] | 6.40±1.67[b] | 6.10±1.59[b] |
| Aroma | 7.35±1.63[a] | 6.95±1.47[a] | 6.30±1.89[a] |
| Texture | 7.75±1.29[a] | 6.90±1.33[ab] | 6.45±1.99[b] |
| Taste | 7.75±1.71[a] | 7.35±1.42[a] | 6.25±1.89[b] |
| Mouth-feel | 7.35±1.04[a] | 6.90±1.48[a] | 5.85±2.06[b] |
| Overall acceptability | 7.55±1.16[a] | 6.90±1.08[ab] | 6.19±1.62[b] |

Values are Mean ± SD. Different superscripts within a row indicate significant difference ($p < 0.05$). Key: $T_1$ = fresh tigernut drink; $T_2$ = reconstituted tigernut powdered drink; $T_3$ = control.

**CONCLUSION AND RECOMMENDATION:** The composite instant tigernut powder provided a convenient value-added product with lower moisture and higher selected proximate components, riboflavin and vitamin E than the fresh drink, while retaining vitamins $B_1$ and C. Although the fresh drink was most preferred, the reconstituted powder was acceptable. Further optimization and storage studies are recommended before commercialization.

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# SUB-THEME 2: ORAL

**SUB THEME 2:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**TITLE:** NUTRITIONAL STATUS AND DIETARY DIVERSITY OF SCHOOL-AGE CHILDREN IN IFO LOCAL GOVERNMENT AREA, OGUN STATE

**Folarin, O. P[1]. and Gabriel, E[1]**

1. Department of Nutrition and Dietetics, The Federal Polytechnic, Ilaro, Ogun State, Nigeria.

**Corresponding email:** paulfolarin00@gmail.com **Tel:** +2349052397457

**Keywords**: School-age children, nutritional status, dietary diversity, dietary diversity score, anthropometry

HIGHLIGHTS

- Most school-age children (91.7%) had normal nutritional status, with only 7.2% being stunted.
- A high proportion (86.1%) of the respondents achieved a high Dietary Diversity Score, indicating good dietary diversity.
- Higher parental educational attainment and improved household socioeconomic status were associated with better dietary diversity and nutritional status among the children.

**BACKGROUND AND OBJECTIVE**

School-age (6-12 years) represents a critical period for growth, cognitive development, and the establishment of lifelong dietary habits. Adequate dietary diversity is recognized as an important indicator of diet quality and micronutrient adequacy among children [1]. Despite improvements in child nutrition globally, malnutrition, including stunting, overweight, and micronutrient deficiencies remains a significant public health concern among school-age children, particularly in low- and middle-income countries [2]. In Nigeria, poor dietary practices continue to contribute to undernutrition and impaired educational outcomes among school-aged children [3]. This study assessed the nutritional status and dietary diversity of school-age children in Ifo Local Government Area, Ogun State, Nigeria.

**MATERIALS AND METHODS**

A school-based cross-sectional descriptive study was conducted among 360 school-age children (6-12 years) selected through a multistage sampling technique from public primary schools in Ifo Local Government Area, Ogun State. Data were collected using a pretested semi-structured interviewer-administered questionnaire. Dietary diversity was assessed using a 24-hour dietary recall and Dietary Diversity Score (DDS) based on FAO guidelines. Anthropometric measurements were obtained using standard procedures, and nutritional status was assessed using WHO AnthroPlus software to generate Height-for-Age (HAZ) and BMI-for-Age (BAZ) Z-scores. Data were analysed using IBM SPSS version 20.0. Descriptive and Chi-square statistics were computed, with statistical significance set at $p < 0.05$.

**RESULTS AND DISCUSSION**

Nearly half (46.7%) were aged 8-10 years, while 51.1% were males. Most fathers (48.6%) and mothers (38.9%) had attained tertiary education (HND/B.Sc.), and a substantial proportion of both parents earned monthly incomes of at least ₦51,000. Anthropometric assessment showed that 91.7% of the respondents had normal height-for-age, whereas 7.2% were stunted. Dietary diversity assessment revealed that 86.1% of the respondents achieved a high Dietary Diversity Score, indicating generally adequate consumption of diverse food groups. Nevertheless, intake of fruits, milk, and milk products remained relatively low among a proportion of the respondents. The low prevalence of stunting observed in this study was lower than the 10.3% reported among

school children in Plateau State by Abah et al. (2017). The high dietary diversity observed may be attributable to the relatively high educational attainment and socioeconomic status of parents, which have consistently been identified as important determinants of children's dietary quality and nutritional status [5]. These findings further support evidence that improved household socioeconomic conditions and parental education are associated with better child feeding practices and nutritional outcomes.

## CONCLUSION AND RECOMMENDATIONS

Most school-age children had normal nutritional status and high dietary diversity, although inadequate consumption of fruits and dairy products remains a nutritional concern. Continuous school- and community-based nutrition education programmes should promote increased consumption of nutrient-dense foods, particularly fruits and dairy products. Strengthening school feeding programmes and improving household nutrition education may further enhance dietary diversity and sustain optimal nutritional status among school-age children.

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**Theme/Sub-Theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

**Title: Effectiveness and Delivery Ecosystems of Narrative and Media-Based Social and Behavior Change Communication Interventions for Maternal and Child Nutrition in Low-and Middle-Income Countries: A Systematic Review & Narrative Synthesis**

**Name of Authors: *Ibidokun, O.E.[1] Ariyo, O.[1]**

**Affiliation of Authors:** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria. *Corresponding author: ibidokunoluwafemi2000@gmail.com +2347086163484

**Keywords:** Social and Behavior Change Communication (SBCC); Entertainment education; Maternal, Infant and Young Child Nutrition (MIYCN); Delivery channels

**Highlights**

- Hybrid mass media with face-to-face channel yield strongest behavioral outcomes.
- Targeting fathers and matriarchs mitigates intrahousehold feeding barriers.
- Communication alone fails to improve linear growth without direct material support.

**BACKGROUND AND OBJECTIVES**: Maternal and child undernutrition accounts for roughly 45% of deaths among children under five across low- and middle-income countries (LMICs). [1] Conventional didactic messaging often fails to translate knowledge into sustained practice due to unaddressed socio-cultural dynamics and intrahousehold power structures. Consequently, social and behaviour change communication (SBCC) using narrative persuasion and entertainment-education has gained traction to make nutrition guidance more culturally engaging and actionable for caregivers. However, evidence on delivery channel and their true clinical impact remains fragmented. This review evaluated the effectiveness, delivery channels, theoretical mechanisms and implementation constraints of storytelling and media-based SBCC interventions targeting maternal, infant and young child nutrition (MIYCN) in LMICs.

**MATERIALS AND METHODS**: This review followed PRISMA 2020 guidelines [2]. PubMed and Google Scholar were searched for primary studies published between January 2021 and April 2026. Eligible studies evaluated storytelling, edutainment, mass media or SBCC programs targeting caregivers of infants aged 0–24 months or pregnant/lactating mothers in LMICs, reporting on IYCF practices, dietary diversity or anthropometry. Quality was appraised using the Joanna Briggs Institute (JBI) Tools. Heterogenous evidence was synthesized narratively across five core dimensions: delivery channels, household dynamics, narrative mechanism, clinical/anthropometric outcome, and implementation limitation.

**RESULTS AND DISCUSSION**: Twenty-One studies met the inclusion criteria. Standalone digital channels achieved high engagement but minimal behavioral gains. Hybrid models (e.g., tablet-assisted home visits, group audio dramas) and multichannel campaigns (Alive & Thrive, ASTUTE) achieved substantial gains in exclusive breastfeeding and dietary diversity. Direct interpersonal counseling remained the single strongest driver of optimal feeding practices.

Targeting fathers via media increased household allocation for nutrient-dense foods (eggs, fish) while engaging mothers-in-law using emotional narrative appeals effectively erases dietary taboos. Narrative transportation and super peer modeling enhanced parental self-efficacy. Peer-led community models achieved significant reductions in low birthweight (10.9% absolute risk reduction) and child underweight prevalence (-18.23%). However, 'knowledge-behavior disconnect' persisted in severe poverty; communication alone failed to improve stunting unless paired with tangible material inputs like specialized food supplements or cash transfers.

**Table 1: Summary Synthesis of Storytelling and Media-Based SBCC Delivery Ecosystems in LMICs**

| Delivery Channel | Key Program Examples | Observed Primary Outcomes | Implementation Limitations |
|---|---|---|---|
| Standalone Digital / mHealth | Amandla Mama (South Africa), Instagram feeds (Indonesia) | High participant satisfaction (4.71/5); improved engagement and peer support. | Constrained by low baseline literacy, shared device dynamics, and load-shedding. |
| Hybrid Interpersonal / Mass Media | Alive & Thrive (Nigeria), ASTUTE (Tanzania), Bhanchhin Aama (Nepal) | EBF increased to 66% at 24 weeks; maternal dietary diversity rose from 7.1% to 19.8%. | Requires sustained health system funding; risk of control group spillover. |
| Peer-Led Community IPC | WDA / HDA Networks (Ethiopia), Mobile Cinema Kits (Sierra Leone) | 10.9% reduction in low birthweight; 45.4% net increase in child minimum dietary diversity. | Volunteers require soft-skills training; short tracking windows limit stunting assessment. |

**CONCLUSION AND RECOMMENDATION(S)**: Storytelling and media-based SBCC interventions are effective, culturally adaptable tools for improving nutrition literacy, reshaping household decision-making, and strengthening IYCF practices in LMICs. Programme designers should prioritize hybrid delivery channels combining broadcast media with structured face-to-face counseling, while systematically engaging fathers and senior matriarchs rather than mothers alone. Furthermore, policy should link narrative communication campaigns to social protection instruments so that vulnerable households can act on nutrition knowledge.

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**Theme/Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

# Nutritional Status and Feeding Patterns of Children Under Five Years in Orphanage Homes in Lafia, Nasarawa State

**Mohammed, H.A., Chiroma, S.I., Olagunju, A., and Abubakar, M.***
Department of Biochemistry, Ahmadu Bello University, Zaria, Nigeria.
**Corresponding author, e-mail: abubakarmuktar168@gmail.com, Tel: 08135914516*
**Keywords:** Malnutrition, Feeding pattern, Orphanage, Nasarawa State

## Highlights

- Over one-third of children were acutely malnourished based on MUAC status
- Chronic stunting was more prevalent than acute wasting among the children

## BACKGROUND AND OBJECTIVES

Malnutrition remains among the most pressing public health problems affecting children under five worldwide, contributing through stunting, wasting and underweight to nearly half of all under-five deaths [1]. Children in orphanages face heightened nutritional risk because institutional routines and resource constraints often replace the individualised, responsive feeding available in family settings [2]. Data on the nutritional wellbeing of children in orphanage care remain scarce in Nigeria, particularly in Nasarawa State, despite persistently high stunting and underweight rates reported among under-five children in the state. This study therefore assessed the nutritional status and feeding patterns of children under five years in three orphanage homes in Lafia, Nasarawa State, and explored the caregiver and institutional factors associated with these outcomes.

## MATERIALS AND METHODS

A descriptive cross-sectional design was adopted across three purposively selected orphanage homes in Lafia LGA: Nasarawa State Children's Home, Habo Orphanage Home and Gidan Bege Orphanage Home. Given the limited number of resident children across all three homes, a total population (census) approach was adopted rather than probability sampling; all 19 resident children under five years were enrolled, along with 16 caregivers and 6 administrators, giving 41 participants in total. Weight, height/length and mid-upper arm circumference (MUAC) were measured by trained personnel using standardised equipment and compared against WHO Child Growth Standards reference medians; MUAC-based classification followed WHO cut-offs for children aged 6–59 months [3]. Structured questionnaires and key informant interviews captured feeding practices, meal frequency, dietary diversity and caregiver characteristics. Data were analysed in SPSS using descriptive statistics.

## RESULTS AND DISCUSSION

Of the 19 children assessed (9 boys, 10 girls; mean age 3.0 years), mean weight (14.9 kg) and MUAC (14.35 cm) fell within the WHO normal range for age, while mean height/length (79.0 cm) was below the WHO reference median of approximately 95 cm for a 3-year-old, suggestive of stunting; formal height-for-age Z-scores were not computed in this analysis and are recommended for confirmation in future work. By MUAC classification, 16% of children had severe and 21% moderate acute malnutrition, a combined rate of 37% (Table 1). Only 63% were fed three times daily, while 21% received just two meals a day. Dietary diversity was limited: grains and starches were eaten daily, while vegetables, fruits and protein-rich foods appeared only one to three times weekly, mirroring institutionalised children in South-West Nigeria, where poor diversity was similarly linked to weak caregiver training [4]. This pattern — normal weight and MUAC alongside a markedly lower mean

height — is consistent with prolonged poor diet quality rather than acute food shortage [5], though confirmation via full anthropometric indices is needed.

**Table 1: MUAC-based nutritional classification of children in the orphanage homes**

| MUAC Status | Frequency | Percentage (%) |
|---|---|---|
| Severe Acute Malnutrition | 3 | 16 |
| Moderate Acute Malnutrition | 4 | 21 |
| Normal | 12 | 63 |
| **Total** | **19** | **100** |

## CONCLUSION AND RECOMMENDATION

Malnutrition among children in the orphanage homes in Lafia was associated with both individual and institutional factors, with chronic stunting more prevalent than acute wasting, and feeding constrained by low dietary diversity and inconsistent meal frequency. Strengthening caregiver training, diversifying food sourcing through community and agricultural partnerships, and instituting routine growth monitoring are recommended to improve nutritional outcomes for children in institutional care.

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Sub-Theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

Title: Traditional Beliefs versus Health Worker Recommendations: A Qualitative Exploration of Persistent Misconceptions About Breastfeeding and Complementary Feeding Among Nursing Mothers in South Senatorial District, Niger State, Nigeria

Yisa, O.O[1]., *Oladejo, E. O.[1], Anoemuah, V.E.[1] and Ariyo, O[1].

[1]Department of Human Nutrition, University of Ibadan, Ibadan, Nigeria

esther.oluwatosin.oladejo@gmail.com, +2348146176841

**Keywords:** Breastfeeding, Complementary feeding, Misconceptions, Traditional beliefs

**Highlights**

- Traditional beliefs continue to shape infant feeding practices.
- Misconceptions persist despite trust in health worker recommendations.
- Socio-economic challenges limit adherence to recommended infant feeding practices.

**Background and Objectives**

Optimal infant and young child feeding (IYCF) practices are essential for child growth, development and survival [1]. However, breastfeeding (BF) and complementary feeding (CF) practices remain suboptimal in Nigeria, with exclusive breastfeeding (EBF) rates of 34.4% nationally and only 15.7% in Niger State [2]. Misconceptions and socio-cultural beliefs continue to influence infant feeding decisions [3], but there is limited qualitative evidence about how they persist despite health worker recommendations in Niger State. This study explored traditional beliefs and misconception about breastfeeding and complementary feeding among nursing mothers in Niger South Senatorial District, Niger State.

**Materials and Methods**

A qualitative descriptive cross-sectional study was conducted where 3 Focus Group Discussions (FGDs) were carried out among eight breastfeeding women who had children aged 0–24 months. Interviews were audio-recorded, transcribed verbatim, and analysed manually to identify recurring beliefs, experiences, and practices, misconceptions, and cultural influences related to breastfeeding and complementary feeding.

**Results and Discussion**

| Theme | Key finding | Illustrative quote |
|---|---|---|
| Traditional beliefs about breastfeeding | Participants recognised the benefits of exclusive breastfeeding, but traditional beliefs, including giving hot water after birth and discarding colostrum, continued to influence breastfeeding practices. | *"They also give hot water to the child... this will make the child's body to be strong."*<br>*"Our traditional mothers believe it is not good that you press it away... but now we know that colostrum is very good."* |

| | | |
|---|---|---|
| Misconceptions about breast milk and lactation | Participants believed that certain traditional foods and drinks such as kunu kanwon, watery pap, tamarind drinks and palm wine increase breast milk production, while others believed that breast size determines milk supply. | *Kunu kanwon... will increase breast milk."*<br><br>*"Our people believe that women with small breasts don't have enough milk."* |
| Traditional versus recommended complementary feeding | Participants recognised the recommendation to introduce complementary foods at six months, but some still introduced water and pap and other foods earlier because of traditional beliefs. | *"Some six months, some three months... some give water from the first day."* |
| Trust in health workers but persistence of cultural norms | Participants consistently reported receiving counselling on recommended infant feeding practices and expressed greater trust in health workers than traditional sources of advice. | *"We should not give water until six months."*<br><br>*"Nowadays, we trust health personnel almost 95%."* |
| Socio-economic barriers | Participants recognised the importance of good nutrition, but poverty, rising food prices limited their ability to follow recommended feeding practices. | *"Most women cannot afford a good balanced diet due to poverty."* |

Despite trusting health worker recommendations, traditional beliefs continued to influence infant feeding decisions [3], showing the need for culturally responsive nutrition education.

**Conclusion and Recommendation**

Traditional beliefs continue to influence infant feeding despite mothers' trust in health worker recommendations. Improving infant feeding practices therefore needs culturally responsive, family-centred interventions that tackle persistent misconceptions, socio-cultural beliefs, and socio-economic barriers.

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REVIEWER'S GENERAL COMMENT

- Pls align the whole write-up
- Implement the corrections/suggestions identified above

**SUB THEME: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

# ASSESSMENT OF ANTROPOMETRIC STATUS AND FOOD CONSUMPTION PATTERN OF POLYCYSTIC OVARIAN SYNDROME (PCOS) WOMEN ATTENDING GYNECOLOGY CLINIC IN ABEOKUTA, OGUN STATE, NIGERIA

***[1]Ilori O.A, [2]Olaitan A.M, [3]Uthman-Akinhanmi, Y.O., [4]Adeosun F., [5]Ilo J.G, [6] Ngozi, E.O [7]Ifebajo, A.Y, [8]Onabajo-Omilani, T.O. [1]Onaolapo T.T, [1]Olatunji T.J, [1]Lam F.J and [1]Umenne O.P***

*[1]Department of Nutrition and Dietetics, Moshood Abiola Polytechnic Abeokuta, Ogun State*

[2]Department of Public Health, Leadcity University, Oyo State, Nigeria

*[3]Department of Home Science and Hospitality Management, Nutrition and Dietetics Unit, College of Agricultural Science, Olabisi Onabanjo University Ago-Iwoye, Ogun State, Nigeria*

*[4]Department of Nutrition and Dietetics, Federal University of Technology, Ilaro Ogun State*

*[5]Department of Nutrition and Dietetics, Federal University of Medical Science, Abeokuta*

*[6]Department of Human Nutrition and Dietetics, School of Allied Health Sciences, Babcock University, Ilisan Ogun State Nigeria*

*[7]Home Economics, Federal College of Education, Akoka, Lagos State*

*[8]Department of Nutrition and Dietetics, Ogun State Polytechic of Health and Allied Sciences, Ilese. Ogun State Nigeria.*

****Corresponding author;** ilori.olasunmbo@mapoly.edu.ng*

## ABSTRACT

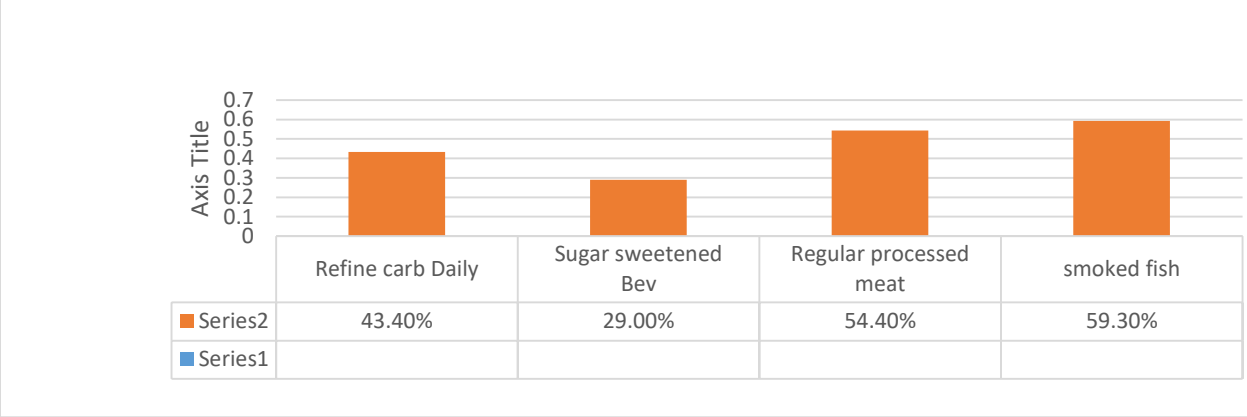
**Background and Objective**: Polycystic Ovarian Syndrome is a multifactorial endocrine disorder associated with metabolic and nutritional abnormalities. This study evaluated nutritional status, dietary patterns, and their associations with PCOS characteristics among women attending a gynecology clinic in Abeokuta, Nigeria.

**Materials and Methods:** A cross-sectional study involving 145 confirmed PCOS women attending gynecology clinic of Federal medical center (FMC), Abeokuta was carried out. Data were collected using validated dietary assessment tools (Food Frequency Questionnaire and 24-hour recall) and standardized anthropometric measurements following World Health Organization protocols. Statistical analyses included chi-square tests, independent t-tests, Pearson correlation, and multivariate logistic regression were conducted at $p< 0.05$.

**Results and Discussion:** Overweight/obesity prevalence was 46.2%, while 32.4% had central obesity. High intake of refined carbohydrates and processed foods was observed. White bread consumption was significantly associated with elevated BMI ($r = 0.42$, $p < 0.001$) and increased odds of severe PCOS symptoms (AOR = 2.87; 95% CI: 1.45–5.68). Processed meat consumption was also associated with higher BMI ($p = 0.025$).

**Figure 1: Consumption Pattern of Risky Foods among Respondents**

Figure 1 shows the consumption pattern of selected risky food as refined carbohydrate (43.40%), sugar sweetened beverage (29.00%), regular processed meat/fish (54.40%) and smoked fish (59.30%) among the respondents.




Dietary patterns were characterized by frequent consumption of refined carbohydrates sugar sweetened beverage and processed foods, with moderate intake of fiber-rich foods. Notably, consumption of white bread was positively correlated with both BMI and PCOS characteristics, as reveal in table 1, suggesting that dietary intake may influence clinical and anthropometric outcomes in this population.

**Table 1: Anthropometry Characteristics and its relationship with risky foods among the Respondents**

| Variables | Mean ± SD | Category | Percentage (%) | Refine carbs (p-value) | Smoked fish (p-value) |
|---|---|---|---|---|---|
| Age (in years) | 25-34 ± 0.01 | Highest frequency | 46.9 | | |
| Body Mass Index (BMI) (Kg/m$^2$) | 25.00-29.00 ±0.01 | Overweight | 33.1 | 0.001 | 0.025 |
| | 30.99-34.99 ±0.01 | Obesity | 13.1 | | |
| Waist to Hip ratio (WHR) | 0.86 ± 0.01 | High risk of Abdominal Obesity | 32.4 | | |

It was also observed that Refine Carbohydrates and smoked fish were significant with one of the major risk factor (overweight and obesity) of PCOS at $p< 0.05$. Overall, women with PCOS in Abeokuta exhibit suboptimal dietary patterns and moderate prevalence of overweight/obesity

**Conclusion and Recommendation:** Poor dietary patterns significantly contribute to adverse nutritional and clinical outcomes in PCOS. Targeted dietary interventions such as high-fiber diets and low smoked food to improve metabolic health are recommended.

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***Key Words**: Polycystic Ovary Syndrome, Diet, Body Mass Index, Dietary Pattern, Nutritional Status, Nigeria.*

**Theme/sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages

**Title**: Growth Velocity of Children (0-18 Months) and Maternal Feeding Rituals in Ekiti State, Nigeria

Akintomide T.H.[1], Ibeanu V.N.[1], *Tobiloba T.D[2] and Onodugo N.G[1]

[1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.

[2]Department of Food Science and Technology, Bamidele Olumilua University of Education Science and Technology, P.M.B. 250 Ikere-Ekiti, Nigeria.

***Corresponding Author:** akintomidetolupe@gmail.com Phone: +2348038326506

**Keywords:** Complementary, IYCF, feeding rituals, growth velocity, Ekiti state.

**Highlights**

- Most mothers demonstrated good infant and young child feeding knowledge
- Optimal complementary feeding improved child growth velocity significantly
- Early introduction of water and concoctions adversely affected growth

**Background:** Optimal nutrition in infancy and early childhood is essential for optimal growth, yet their nutrition remains suboptimal and of public health importance in Nigeria.

**Objective:** This study assessed infant and young child feeding (IYCF) practices and growth velocity among children aged 0–18 months in Ekiti State, Nigeria.

**Methods:** The study was conducted among 600 purposively selected mother-child pairs from health facilities in four local government areas (LGAs) in the state Data were collected using structured questionnaires, 24-hour dietary recall, and anthropometric measurements. Data from the questionnaire was analysed using SPSS version 21 at univariate and bivariate levels ($p < 0.05$), while dietary diversity scores and anthropometric indices were derived from 24-hour dietary recall and anthropometry, respectively and compared with reference standards.

**Results:** Most mothers (88.00%) had optimal IYCF knowledge; 77.10% initiated breastfeeding within one hour, 22.00% practiced pre-lacteal feeding, and 64.95% exclusively breastfed for six months. Among children aged 6–18 months, 66.00% met minimum dietary diversity and 63.0% meal frequency. Overall, 84.53% had normal weight, while 11.72% were underweight, 7.10% stunted, 9.84% wasted, and 3.82% overweight/obese. Significant associations existed between anthropometric indices and sex or age ($p < 0.05$). Growth velocity was adequate in most children and positively associated with IYCF maternal feeding rituals ($p < 0.001$). Early introduction of water/concoctions was linked to adverse growth, while optimal complementary feeding improved it ($p < 0.001$).

**Conclusion:** Mothers demonstrated good IYCF knowledge and rituals. Continued education and routine growth monitoring are recommended for utmost growth velocity.

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**Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stage.**

**Title: Maternal Nutritional Knowledge, Food Security, and Anthropometric Status as Determinants of Child Malnutrition: A Cross-sectional Analysis in Abakaliki Local Government Area, Ebonyi State, Nigeria.**

**Name of Author (s): Akinade E. Ogunniyi[1"3]* and Chinelo U. Eze[2]**

**Affiliation of Author (s):** [1] Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Oyo State, Nigeria

[2] Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria

[3] Nutrition Department, Ministry of Health, Ebonyi State, Nigeria

**Correspondence:** enochakinade4@gmail.com

**Keywords:** Maternal nutrition, Food insecurity, Dietary diversity, and malnutrition.

**Highlights**

- 89% of children were underweight despite 78.5% of mothers having tertiary education
- Children of knowledgeable mothers had higher malnutrition rates than those with less knowledge
- Food insecurity affected child nutrition more than maternal knowledge or education level

**Background and Objectives:**

Child malnutrition remains a critical public health challenge in sub-Saharan Africa, with Nigeria bearing one of the highest burdens globally [1]. Maternal factors, particularly nutritional knowledge, food security status, and anthropometric characteristics, are key determinants of child nutritional outcomes [2]. However, the complex interplay between these factors in resource-constrained settings remains poorly understood. This study examined how maternal nutritional knowledge, household food security, and maternal anthropometric status collectively influence the nutritional status of children under five years in Abakaliki Local Government Area, Ebonyi State.

**Materials and Method:**

A cross-sectional study was conducted among 261 mother-child pairs (children aged 6-59 months) attending ten purposive selected primary healthcare centers in Abakaliki Local Government Area. Data were collected using structured questionnaires adapted from FAO guidelines covering sociodemographic characteristics, maternal nutritional knowledge (19-point scale: adequate ≥10 points), household food security (12-point scale), and child feeding practices. Anthropometric measurements were taken for both mothers and children using standardized procedures. Child nutritional status was assessed using WHO Z-scores for weight-for-height (WHZ), height-for-age (HAZ), and weight-for-age (WAZ). Data analysis employed descriptive statistics, chi-square tests, and Pearson correlation analysis using SPSS version 29.

**Results and Discussion:** Despite 78.5% of mothers having tertiary education, severe malnutrition prevalence was alarming: 89% of children were underweight (73% severely), 68% were stunted (42% severely), and 66% were wasted (47% with severe acute malnutrition). Maternal nutritional knowledge showed significant gaps despite high education levels - only 48.7% correctly understood that children with diarrhea should continue breastfeeding, and responses regarding complementary feeding timing were almost evenly divided (44.8%

correct vs. 49.4% incorrect). Paradoxically, children of mothers with adequate knowledge showed higher rates of severe stunting (44.9% vs. 18.2%) and severe underweight (74.2% vs. 63.6%) compared to those with inadequate knowledge. Food security analysis revealed that severe acute malnutrition affected 46.2% of children from severely food insecure households and 48% from moderately food insecure households ($p<0.001$). Maternal anthropometric status demonstrated strong intergenerational effects, with 60% of children from underweight mothers being severely underweight themselves.

**Conclusion and Recommendation:**

This study revealed a severe child malnutrition crisis in Abakaliki Local Government Area, with prevalence rates far exceeding WHO emergency thresholds. The paradoxical finding that children of knowledgeable mothers experienced higher malnutrition rates highlights that nutrition education alone is insufficient when structural barriers persist. Food insecurity emerged as a fundamental driver of child malnutrition across all categories [2]. The strong intergenerational patterns emphasize the importance of addressing maternal nutrition alongside child-focused interventions. These findings indicate an urgent need for multi-sectoral approaches that move beyond knowledge-based interventions to address underlying determinants including food systems, economic empowerment, and healthcare access. Emergency nutritional interventions are immediately required, complemented by longer-term sustainable development approaches targeting structural determinants of malnutrition in resource-constrained settings.

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**Subtheme:** MIYCN as a veritable framework for delivering Nutrition-sensitive and Nutrition-specific interventions across life stages

**Title:** Nutrition-knowledge, Dietary-practices and Nutrition-status of pregnant women attending

Antenatal care at selected Primary Healthcare Centers in Ekiti State

**Author names**: E. O. Adaramola[1] O. F. Folasire[2,3]

Email: (adaramola.eniola@bouest.edu.ng, yemisifolasire2011@gmail.com), 08034678811

**Author Affiliation:** Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti, Ekiti State[1]. University of Ibadan, Oyo State[2], University College Hospital (UCH), Ibadan, Oyo State[3]

**Keywords:** Malnutrition, Antenatal care, Nutrition education, Pregnancy

**Highlights**

- A prevalence of mild/moderate anaemia, overweight/ obesity, with medium dietary diversity was noted among the pregnant women
- Wide disparities existed between nutrition knowledge and dietary practices

**Background and Objectives**:

Antenatal care (ANC) is the primary platform for delivering nutrition-specific interventions, particularly nutrition education, in Nigeria; however, evidence shows substantial gaps between nutrition knowledge (NK) and dietary practices (DP)of these interventions among pregnant women attending ANC, with subsequent implications for their nutritional status [1]. This study aims to assess NK, DP, and nutritional status among pregnant women attending antenatal clinics at selected Primary Health Centres (PHCs) in Ekiti State.

**Methodology:** A cross-sectional study was conducted using a validated, interviewer-administered questionnaire (Cronbach's $\alpha = 0.837$). The sociodemographic characteristics, NK, DP and nutritional status indicators of 320 proportionally sampled pregnant women across six randomly selected PHCs were collected between November 2023 and March 2024. The chi-square test was used to assess associations between variables, with significance set at $p<0.05$.

**Results and Discussion:** The mean age of the participants was 26.6±4.6 years, with mean scores of NK=43.47±16.22 and DP=67.49±7.56. Nutritional status indicators revealed a prevalence of 35% mild/moderate anaemia; 54% overweight/obesity; and 71.9% medium dietary diversity score (DDS) among the respondents. Table 1 shows the association between NK, DP, and the nutritional status of the respondents; NK is associated with body composition (MUAC), while DP is associated with anaemia status and dietary diversity of the respondents. The study revealed a prevalence of the double burden of malnutrition in pregnancy, with disparities between NK and DP among the study population.

**Table 1: Association between Nutritional Status, Nutrition-knowledge, and Dietary-practice of the pregnant women**

| Variable | Nutrition-Knowledge (NK) | | | | | Dietary-Practice (DP) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Inadequate | Moderate | Adequate | $x^2$ | p≤0.05 | Inadequate | Moderate | Adequate | $x^2$ | p≤0.05 |
| PCV | | | | | | | | | | |
| Mild | 33.3 | 66.7 | 0.0 | | | 33.3 | 0.00 | 66.7 | | |
| Moderate | 66.7 | 27.3 | 1.8 | | | 12.7 | 34.5 | 52.7 | | |
| Normal | 0.0 | 32.4 | 6.9 | 9.024 | 0.061 | 3.9 | 36.3 | 59.8 | 15.742 | 0.030* |
| MUAC | | | | | | | | | | |
| Underweight | 66.7 | 33.3 | 0.0 | | | 16.7 | 33.3 | 50.0 | | |
| Normal | 73.1 | 26.9 | 0.0 | | | 6.0 | 28.4 | 65.7 | | |
| Overweight/obese | 56.3 | 34.5 | 9.2 | 18.221 | 0.001* | 8.0 | 40.2 | 51.7 | 7.573 | 0.109 |
| DDS | | | | | | | | | | |
| Low | 52 | 20 | 2 | | | 12 | 32 | 30 | | |
| Medium | 140 | 76 | 14 | | | 12 | 78 | 140 | | |
| High | 12 | 4 | 0 | 4.094 | 0.393 | 0 | 2 | 14 | 20.782 | 0.000* |

**Conclusion and Recommendation:** This study underscores the role of NK and DP, and their associated sociodemographic factors, in improving the nutritional status of pregnant women [1].

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**SUB-THEME: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

## Morbidity Indicators and Socioeconomic Determinants of Child Malnutrition among Children aged 6–23 Months in Nigeria: Evidence from Pooled NDHS Data 2003–2024

Sulaiman, S.[1,3*], Okoth, J.[1], Frank, S.[2], Abubakar, S. M.[2]

[1]Royal (Dick) School of Veterinary Studies, University of Edinburgh, United Kingdom

[2]Gillings School of Global Public Health, University of North Carolina at Chapel Hill, United States

[3]Nutrition and Dietetics Unit, Department of Biochemistry, Faculty of Basic Medical Sciences, Bayero University, Kano, P. M. B. 3011, Kano – Nigeria

[*]Correspondence Author: sulaimansaadatu12@gmail.com

**Keywords:** Malnutrition, Morbidity, Socioeconomic determinants

**Highlights**

- Anaemia and fever were the strongest morbidity predictors of child malnutrition
- Maternal education was the key socioeconomic predictor of child malnutrition

**BACKGROUND AND OBJECTIVES:** Child malnutrition remains a major public health concern in Nigeria, where an estimated 39.5% of children aged 6–59 months are stunted, 8.4% wasted, and 26.6% underweight.[1] This study examined associations between morbidity indicators and child malnutrition, and assessed the influence of socioeconomic factors on malnutrition outcomes among children aged 6–23 months in Nigeria.

**MATERIALS AND METHODS:** A secondary cross-sectional analysis of pooled data from five rounds of NDHS (2003, 2008, 2013, 2018, and 2024) was conducted on 25,093 children aged 6–23 months from all six geopolitical zones. Survey weights were applied throughout. Multivariable Poisson regression with robust variance estimation produced Prevalence Ratios (PR) and 95% confidence intervals, adjusted for survey year, geopolitical zone, child sex, and age. Anaemia analyses were restricted to the 2018 and 2024 NDHS datasets, as haemoglobin measurements for children were only collected in these two rounds and were not available in the 2003, 2008, and 2013 datasets.

**RESULTS:** Anaemia was the strongest morbidity predictor of stunting and wasting. Fever was significantly associated with stunting, wasting, and underweight, while diarrhoea was associated with underweight only. Acute respiratory tract infection (ARI) showed no significant associations.

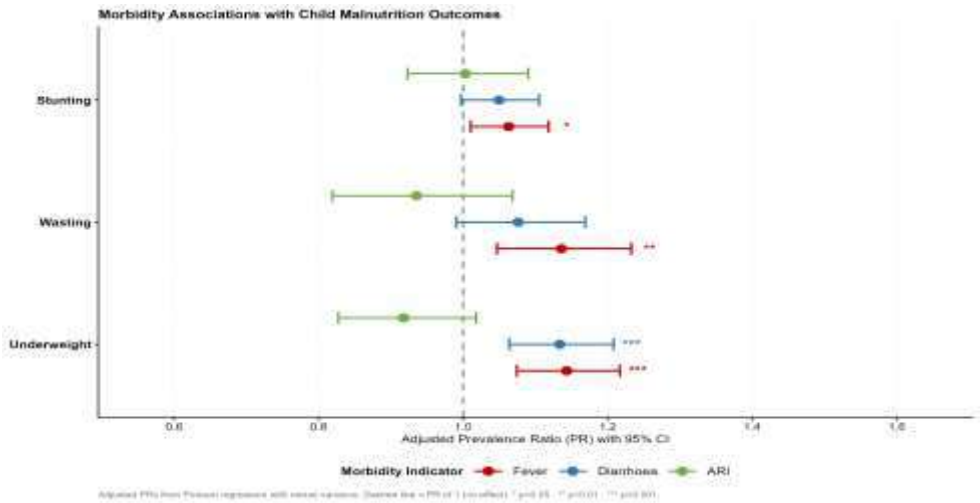



*Figure 1: Morbidity association with child malnutrition outcomes*

Maternal education was the strongest socioeconomic predictor of child malnutrition. Underweight declined significantly with increasing household wealth, while urban children showed slightly higher underweight risk than rural children.

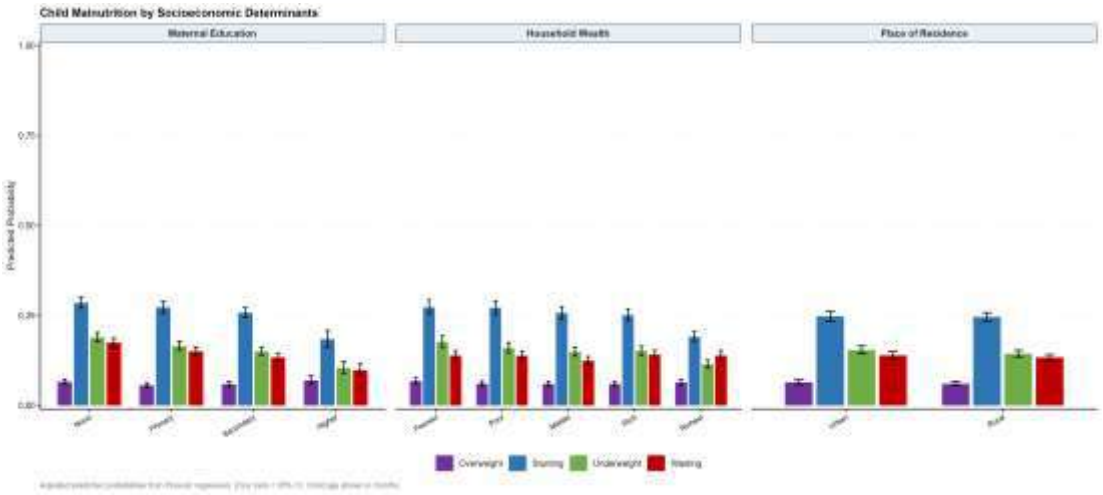



*Figure 2: Influence of socioeconomic determinants on child malnutrition outcomes*

## CONCLUSION AND RECOMMENDATION

Findings indicate that controlling anaemia and fever, reducing diarrhoeal disease, strengthening maternal education, and improving household wealth are essential policy priorities for reducing stunting, wasting, and underweight among children aged 6–23 months in Nigeria.

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**Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

# MATERNAL NUTRITION BEHAVIOUR AND NUTRITIONAL STATUS OF LACTATING MOTHERS IN FOUR RURAL COMMUNITIES OF BAUCHI STATE, NIGERIA: A COMPARATIVE CROSS-SECTIONAL STUDY

Adebusoye, Michael. Sunday[1], Samson kuritin Bayawa[2], Francis Chinwendu Vivian[2], Angwedel Yila. Richard[2], Florence Yakubu Gayus[2] & Aderinkomi Abosede[3]

[1]*Department of Human Nutrition and Dietetics, Federal University of Health Sciences, Ila-Orangun, Osun-State, Nigeria.

[2] Department of Nutrition and Dietetics, Gombe State College of Health Sciences and Technology, Kaltungo, Nigeria.

[3] Guidance and Counselling Unit, Federal Polytechnic, Bauchi, Bauchi-State. Nigeria

* **Corresponding author:** adebusoye912@gmail.com; +2348038782455

## Highlights

- In rural Bauchi State, 23.5% of lactating mothers were underweight (community range: 18.8–35.0%).
- Only 33.1% achieved minimum dietary diversity, and 48.1% avoided foods due to cultural beliefs.
- Strongest underweight predictors: inadequate dietary diversity (AOR=6.92), low income <₦30,000 (AOR=4.23), and Bishin Fulani residence (AOR=2.84).
- Overall, 59.2% ate only two meals daily, underscoring urgent need for targeted nutrition interventions.

**Background:** Maternal nutrition during lactation is essential for postpartum recovery, adequate breast milk production, and optimal infant growth and development. However, lactating mothers in rural northern Nigeria often face socioeconomic, cultural, and dietary challenges that negatively affect their nutritional status and health outcomes.

**Objective:** This study evaluated maternal nutrition behaviours and nutritional status among lactating mothers residing in four rural communities of Bauchi State, namely Gwallameji, Yelwa, Bishin Fulani, and Doka, and investigated the factors associated with undernutrition.

**Methods:** A community-based comparative cross-sectional study was conducted among 520 lactating mothers aged 18–40 years selected through multistage sampling. Data were collected using structured interviewer-administered questionnaires to collect information on dietary intake using- 24-hour dietary recalls method, while dietary diversity was assessed using the Minimum Dietary Diversity for Women (MDD-W) indicator. Body Mass Index (BMI) and Mid-Upper Arm Circumference (MUAC) of the respondents were determined. Bivariate and multivariate logistic regression analyses were performed to identify factors associated with underweight.

**Results:** The overall prevalence of underweight was 23.5%, with significant differences across communities: Gwallameji (18.8%), Yelwa (22.9%), Bishin Fulani (35.0%), and Doka (20.9%) ($p = 0.015$). Only 33.1% of mothers achieved the recommended MDD-W, varying from 21.0% in Bishin Fulani to 38.8% in Gwallameji ($p = 0.008$). Dietary practices were generally poor, with 59.2% consuming only two meals daily and 48.1% avoiding certain foods due to cultural beliefs. Multivariate analysis showed that residence in Bishin Fulani (AOR

= 2.84; 95% CI: 1.56–5.17), inadequate dietary diversity (AOR = 6.92; 95% CI: 3.41–14.05), and household income below ₦30,000 (AOR = 4.23; 95% CI: 1.98–9.04) significantly increased the likelihood of underweight.

**Conclusion:** Undernutrition remains a significant public health challenge among lactating mothers in rural Bauchi State, particularly in underprivileged communities. Targeted interventions aimed at improving dietary diversity, household economic status, nutrition education, and access to healthcare services are needed to enhance maternal nutritional outcomes.

**Recommendations**: Community-based nutrition education should be strengthened, dietary diversity promoted, women's economic empowerment improved, maternal nutrition services enhanced, food taboos addressed, and underprivileged communities prioritized.

**Keywords:** Lactating mothers, maternal nutrition, dietary diversity, rural communities, Bauchi State

**Theme/Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across life stages**

# Assessing the Influence of Maternal Lifestyle on Pregnancy Outcomes in selected secondary health facilities in Abeokuta South Local Government Area, Ogun State

Akinbule, Oluwafunke O. and Salaudeen, Odunayo A.

**Author (s) Affiliation**: *Department of Nutrition, Federal University of Agriculture Abeokuta,*

Corresponding Author's e-mail: olufunkeakinbule@gmail.com , (Phone no.: 08061241115)

**Keywords:** maternal lifestyle, pregnancy outcomes, dietary diversity, nutritional status

Highlights

- High rates of hypertension and diabetes coexist with low dietary diversity.
- Only 1% of pregnant women met recommended fruit and vegetable intake.
- Maternal alcohol intake and poor sleep linked to poor neonatal outcomes.

**Background and Objective**: Maternal nutrition during pregnancy is critical for foetal development and preventing obstetric complications. In Nigeria, pregnant women face a "double burden" of malnutrition, where rising overweight and obesity rates coexist with undernutrition and micronutrient deficiencies (1). Despite high educational and employment statuses, nutritional transitions have led to diets dominated by energy-dense staples like grains and tubers, often exacerbated by eating away from home. Concurrently, a behavioural shift towards eating away from home has severely compromised the consumption of essential micronutrients derived from fresh fruits and vegetables (2). These poor nutritional behaviour and inadequate diet diversity significantly elevate the risk for severe clinical complications, most notably gestational hypertension, gestational diabetes mellitus, and maternal anemia. This study aimed to assess the influence of maternal lifestyle on pregnancy outcomes in selected secondary health facilities in Abeokuta South Local Government Area, Ogun State.

**Materials and Methods**: A cross-sectional survey of 300 pregnant women in their third trimester was conducted. Three hospitals (State hospital, Ijaiye, Oba Ademola Maternity hospital and Oke-Ilewo primary health care centre) were randomly selected among the seven government hospitals in Abeokuta South. Respondents who gave their consents were proportionately recruited at antenatal clinic. Data was collected on respondents' food group diversity consumed in the last 24 hours, fruit and vegetable intake, sleep duration, alcohol and physical activity status, using the WHO steps instrument. Respondents were monitored until delivery and data were obtained on neonatal outcomes. Anthropometry, blood pressure, and iron deficiency anemia were assessed using standard procedures. Data were analysed and presented with frequency count, percentages means and standard deviations. Multivariate regression analysis was used to test for association among variables at $p<0.05$. Ethical approval was obtained from Ogun State Health Management Board.

## Results and Discussion

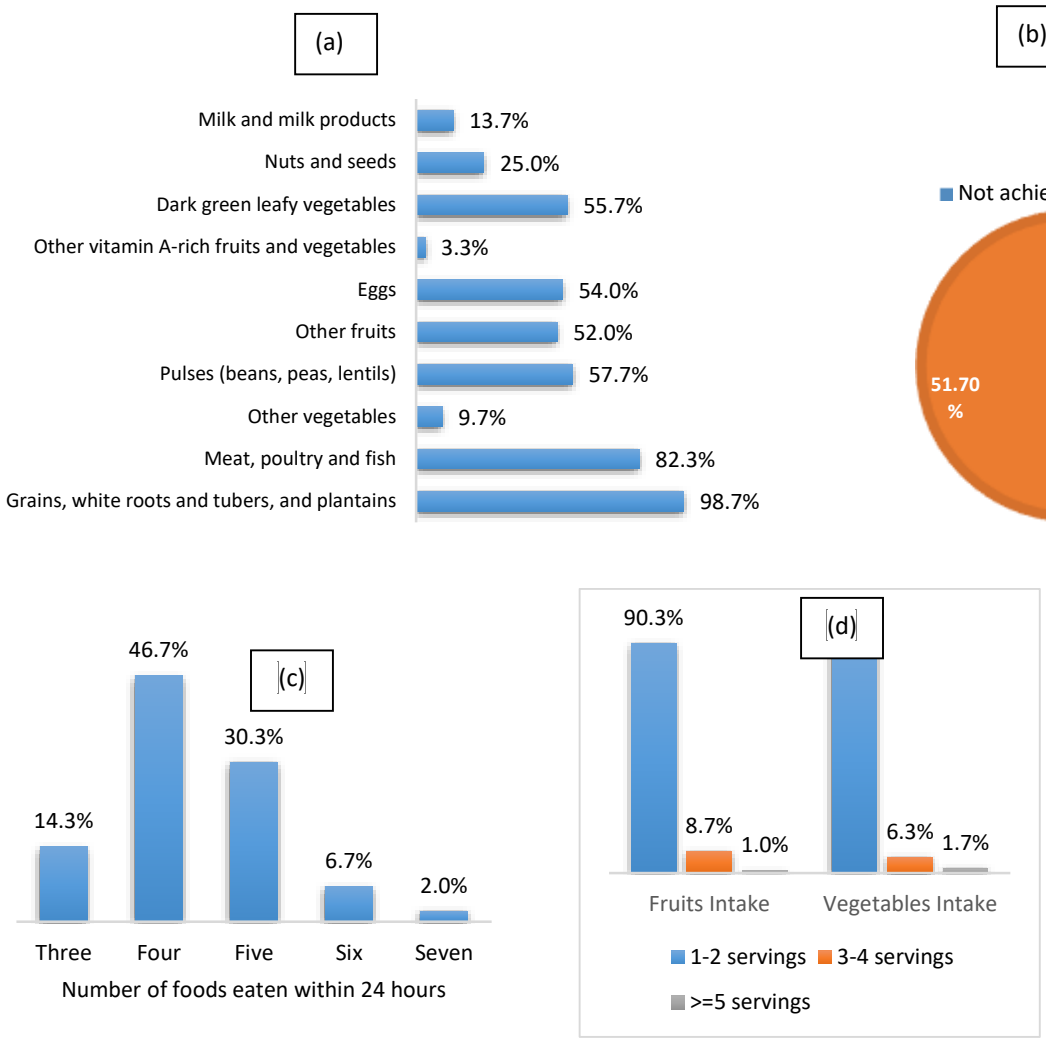
### Socio-demographic and clinical characteristics of the respondents

More than one-third (38.7%) of the respondents were within 26-30 years, 94% were married, 66.7% had tertiary education, 89% were employed, and 56.7% earned above ₦230,000. The average gestational age of the respondents was 33.81±1.59 weeks, 41.0% were primigravida, and about 16% of the mothers had cardiometric complications during pregnancy with the most prevalent complication was hypertension (39.6%), followed by

diabetes (27.1%), urinary tract infection (25.0%) ante-partum haemorrhage (6.3%), and premature rupture of membrane (2.1%). The mean pregnancy weight gain was 12.5 kg with an interquartile range of 1.0. The prevalence of hypertension among the pregnant women in the study areas was 38.7%, 29.7% had tachypnoea, indicating an underlying physiological stress. The prevalence of iron-deficiency anemia was 6.0%. This suggests that the need to prioritise early screening for non-communicable metabolic diseases beyond basic nutrition assessment among pregnant women.

**Dietary and lifestyle of the respondents**

Grains, white roots and tubers, and plantains were the most consumed, accounting for 98.7% of the diet, followed by meat, poultry and fish (82.3%), pulses (57.7%), dark green leafy vegetables (55.7%), eggs (54.0%), other fruits (52.0%), nuts and seeds (25.0%), milk and milk products (13.7%), other vegetables (0.7%) while other vitamin A-rich fruits and vegetables were the least consumed (3.3%) (Fig. 1a)(2). About half (51.7%) achieved the minimum dietary diversity for women (Fig. 1b). Previous study (2) reported similar finding. Almost half (46.7%) ate four times daily, while 39% ate more than four times per day. About 83.6% eat away from home with 49.6% eating at away from home for at least 3 times/week (Fig. 1c). About 90.0% of the respondents consumed 1-2 servings of fruits and vegetable per week. Only 1.0 and 1.7% met the recommendation ($\geq$ 5 servings/week) for fruit and vegetable consumption, respectively (Fig. 1d), although 55.7% consumed fruit and vegetable at least 3 times per week. Essential micronutrients like folate, potassium, and natural antioxidants found in fresh fruits are vital for early placental vascularization, nutrient transport, and foetal neurodevelopment (3). More than half (56.3%) of the women had less than 30 minutes physical activity, 14.3% slept for less than six hours per night. About 14.7% have taken at least one alcoholic drink at a mean age of 22.7$\pm$ 2.57 years.




1 serving = 80g

**Fig. 1: Food group diversity (a) and minimum dietary diversity score (b), and the number of foods consumed in 24 hours (c) and Weekly fruits and vegetables intake of the respondents**

**Pregnancy outcomes among the respondents**

Adverse neonatal outcomes included caesarean delivery (10.0%), low birth weight (13.7%), stunting/short birth length (42.3%), and small head circumference (66.3%). These staggering numbers suggest a widespread occurrence of intrauterine growth restriction. Multivariate regression showed that maternal alcohol intake (p=0.001), inadequate sleep (p=0.001), and low physical activity were strongly associated with reduced birth length. Alcohol intake also significantly predicted low birth weight and lower gestational age (p=0.001). Importantly, meeting the MDD-W threshold and maintaining adequate mid-upper-arm circumference (MUAC) were protective indicators significantly associated with longer gestational age, birth length (p=0.01), and head circumference (p=0.00). high maternal dietary diversity is a proxy for adequate micronutrient adequacy (4). This suggests that infants might have adequate micronutrient adequacy. Higher frequency of maternal fruit servings also directly correlated with optimal neonatal head circumference (p=0.04). Antioxidant properties in fruits have protective effect on the rapidly developing lipid-rich fetal brain from oxidative stress (5).

**Conclusion**

A high prevalence of cardiometabolic risk factors—namely gestational hypertension and diabetes—coexists with profound dietary deficits in fruit and vegetable intake and a heavy reliance on outside food sourcing among pregnant women in Abeokuta. Unhealthy lifestyle habits, such as maternal alcohol intake, sleep deprivation, and poor dietary diversity, are critical modifiable drivers directly linked to adverse neonatal development (short birth length and lower head circumferences). Targeted prenatal lifestyle counselling and structured nutritional interventions are urgently required across public healthcare facilities in Ogun State to curb these risks.

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**Subtheme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages**

**Title: Anthropometry Assessment of Exclusively and Non-Exclusively Breastfed Babies 0-6 Months in Umuahia North.**

**Authors: Onyemaobi, K. R.[1], Onuoha, A. M.[2]**

**Affiliation of Authors: [1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike.**

**[2]Department of Food Science and Technology, Bamidele Olumiluo University of Education, Science and Technology, Ikere-Ekiti**

Corresponding author: Miracleonuoha48@gmail.com. +234906069099.

**Keywords**. Exclusive breastfeeding, non-exclusive breastfeeding, Anthropometric assessment.

**Highlight.**

- 79.6% of the mothers are multiparous mothers.
- 48.2% of the respondents were unsure about their diets during pregnancy.
- prevalence of underweight, stunting, obesity and overweight is low among exclusively breastfed babies

- Background: Nigeria accounts for one of the highest African countries with high mortality rates and low breastfeeding rates, this has led to an increase in the number of malnourished children and children with low immunity and diseases including death. [1]. an estimated 13% reduction in infant mortality rate can be achieved through the practice of exclusive breastfeeding [2]. The study assessed the nutritional status of exclusively and non-exclusively breastfed infants (1-6 months) of age in Umuahia North, and their mothers obstetric/medical history.

**Materials and Methods**: The study adopted a cross sectional survey method. A multistage sampling procedure was used in choosing the sample. The population of the study include only nursing mothers of infants between the ages of 1-6 months of age located in Umuahia north local government area, Abia state. Anthropometry indices such as mid upper arm measurements, weight, height, and head circumference were used to determine the nutritional status of the respondents. WHO anthropo was used to determine the nutritional status of the child based on WHO recommendations.

**Results and Discussion:** The study revealed that the female infants were dominant (54%). Infants aged 6 months (29.2%) and 5months (24.4) old were predominant in the study respectively. The study also revealed that the majority of the infants were birthed through the vaginal method (48%) and naturally induced labour. Only a few numbers of mothers had suffered hypertension (38.4%), depression (14%) and gestational diabetes (23.2%) during pregnancy. The study also revealed that the prevalence of underweight (5.2%), stunting (3.2), overweight (10%), malnourished (6%) and obesity (3.2%) among exclusively breastfed babies were very low compared to those of the non-exclusively breastfed babies Also, the prevalence of stunting is at 5.2%, 5.6%, 5.2% and 10.8% for infants aged 1-2 months, 3-4 months, 5 months old and 6 months old respectively. This result can be attributed to the fact that the infants were not exclusively breastfed and might as such be limited in the required amount of nutrient required for their growth and development. [3].

**Table 1. Nutritional Status of exclusively breastfed babies.**

| Variables | Age grades (months) | | | | |
|---|---|---|---|---|---|
| | 1-2months N (%) | 3-4mts N (%) | 5mnth N (%) | 6mnths N (%) | Total N (%) |
| **WAZ** | | | | | |
| Normal (>-2SD) | 10 (4.0) | 14 (5.4.) | 5 (2.0) | 23 (9.4) | 52 (20.8) |
| Underweight (<-2DS) | 0 (0.0) | 0 (0.0) | 13 (5.2) | 0 (0.0) | 13 (5.2) |
| **HAZ** | | | | | |
| Normal (> -2SD) | 12 (3.6) | 6 (2.4) | 19 (7.6%) | 22 (9.2) | 59 (22.8) |
| Stunted (< -2DS) | 0 (0.0) | 2 (1.0) | 0 (0.0) | 4 (2.2) | 6 (3.2) |
| **MUAC** | | | | | |
| Not malnourished (>13.5cm) | 7 (2.8) | 10 (4.0) | 18 (7.2) | 15 (6.0) | 50(20) |
| Malnourished (≤13.5cm) | 0(0.0) | 0 (0.0) | 5 (2.0) | 10 (4.0) | 15 (6.0) |
| **BMI for age Z score** | | | | | |
| Normal (0-2SD) | 0 (0.0) | 9 (3.6) | 15 (6.0) | 8 (3.2) | 32 (12.8) |
| Overweight (> +2SD) | 0 (0.0) | 7 (2.8)) | 9 (3.6) | 9 (3.6) | 25 (10.0) |
| Obese (> +3SD) | 0 (0.0) | 8 (3.2) | 0 (0.0) | 0 (0.0) | 8 (3.2) |

**Table 1b. Nutritional status of nonexclusively-breastfed babies**

| Variables | Age grades (months) | | | | |
|---|---|---|---|---|---|
| | 1-2months N (%) | 3-4mts N (%) | 5mnth N (%) | 6mnths N (%) | Total N (%) |
| **WAZ** | | | | | |
| Normal (>-2SD) | 32 (12.8) | 7 (3.8%) | 32 (12.8%) | 30(12.0) | 101 (41.4) |
| Underweight (<-2DS) | 29 (11.6%) | 15 (7.0) | 30 (9.0) | 10 (5.0) | 84 (32.6) |
| **HAZ** | | | | | |
| Normal (> -2SD) | 28(11.2) | 24 (9.6) | 25 (10.0) | 41 (16.4) | 118 (47.2) |
| Stunted (< -2DS) | 13 (5.2) | 14 (5.6) | 13 (5.2) | 27 (10.8) | 67 (26.8) |
| **MUAC** | | | | | |
| Not malnourished (>13.5cm) | 21 (8.4) | 28 (11.2) | 30 (12.0) | 32 (12.8) | 111 (44.4) |
| Malnourished (≤13.5cm) | 12 (4.8) | 25 (10.0) | 21 (8.4) | 16 (6.4) | 74 (29.6) |
| **BMI for age Z score** | | | | | |
| Normal (0-2SD) | 17 (6.8) | 34 (13.6) | 31 (12.4) | 24 (9.6) | 106 (42.4) |
| Overweight (> +2SD) | 0 (0.0) | 15 (6.0) | 11 (4.4) | 19 (7.6) | 45 (18.0) |
| Obese (> +3SD) | 0 (0.0) | 11 (4.4) | 16 (6.4) | 7 (2.8) | 34 (13.6) |

## Conclusion:

The study revealed a great difference in the nutritional status of exclusively breastfed babies and the non-exclusively breastfed babies in Umuahia North. 32% of non-exclusively breastfed babies were underweight, while only 5.2% were below (<-2DS) in exclusively breastfed babies. It is recommended that handling out breastfeeding packages as incentives should be adopted in order to promote excusive breastfeeding as a whole and simplified methods of teaching and sensitization of mothers should be adopted in order to have an effective outcome.

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**Sub Theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages.**

**Title: Food Taboos, Myths and Nutritional Knowledge Influencing Dietary Patterns of Pregnant Women in Ile -Ife**

Oseni-Ogundipe, R.I[1,] Ajibola-Akinniyi R.A.[2] Olaosebikan P.V.[3], Daniyan F.O[4]. Alagbo, P.K[5] Ekundare, O.M[6]

[1]Department of Human Nutrition and Dietetics, Federal University of Health Sciences, Ila-Orangun, Osun State)

[2]Department of Dietetics, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Osun State

[3]North East London NHS Foundation Trust, Rainham, Essex).

[4]Optymah Nutrition Consult Limited, Ondo State

[5]Department of Human Nutrition and Dietetics, Obafemi Awolowo University, Ile-Ife, Osun State

[6]Department of Food Science and Nutrition, Landmark University, Omu-Aran, Kwara State.

Corresponding Author: rukayat.oseni-ogundipe@fuhsi.edu.ng, 08063568736.

KEYWORDS: Food taboos, Myths, Nutritional knowledge, Pregnant women, Ile-Ife.

**Background and Objectives:** Nutrient requirements during pregnancy vary; however, nutrient intake by pregnant women is influenced by cultural practices, including food taboos and myths (1). In many communities, certain nutritious foods are prohibited for pregnant women based on unverified cultural, social, or religious beliefs (2), limiting dietary diversity and increasing the risk of adverse health outcomes (3). This study assessed food taboos, myths, nutritional knowledge, and dietary practices among pregnant women in Ile-Ife

**Materials and Methods:** A two-stage sampling technique was used to select 100 pregnant women attending the selected health centers in Ile-Ife. A semi-structured questionnaire was administered to the pregnant women, and a focus group discussion session was conducted with 6 mothers to enhance, as well as clarify, the quantitative results generated. Quantitative data was analyzed using descriptive statistics and Chi-square test at p=0.05, while qualitative data was analyzed thematically.

**Results and Discussion:** About a quarter (28%) of respondents reported general food taboos in their culture. Common taboos included avoidance of snail, banana, okro, bush meat, plantain, milk, and bournvita. The majority (71.3%) demonstrated good nutritional knowledge. Most respondents (64%) ate more than three times daily, though 15.3% skipped meals. Dietary diversity showed adequate intake of staples and animal-source foods but inconsistent consumption of vegetables, legumes, and dairy.

**Table 1: Food Taboos and Myths among respondents**

| | Frequency (N) | Percent (%) |
|---|---|---|
| **Do you consider any food taboos and myths when selecting foods that you consume during pregnancy?** | | |
| Yes | 28 | 28 |
| No | 72 | 72 |
| **Food taboos mentioned** | | |
| No response | 74 | 74.0 |
| Banana | 3 | 3.0 |
| Snail | 11 | 11.0 |
| Bournvita | 2 | 2.0 |
| Milk | 2 | 2.0 |
| Okro | 3 | 3.0 |
| Bush meat | 3 | 3.0 |
| Plantain | 2 | 2.0 |
| **Reasons given for food taboos.** | | |
| No response | 82 | 82.0 |
| Allergy | 1 | 1.0 |
| because it is forbidden from husband's family | 3 | 3.0 |
| Drooling | 5 | 5.0 |
| Dislike | 2 | 2..0 |
| Difficulty in labor | 2 | 2.0 |
| Causes **excessively large babies** | 4 | 4.0 |
| Disrupts bowel movement | 1 | 1.0 |

**Conclusion and Recommendation:** Snail, banana, okro, and bush meat were the major food taboos identified as common among the pregnant women. The study revealed that the women had good nutritional knowledge but poor dietary practice, highlighting the need for targeted interventions. Dietitians and nutritionists should be integrated into primary health care teams to deliver targeted nutrition education that addresses specific food taboos and myths prevalent in the community.

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**Sub-Theme: MIYCN as a veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

**Topic: Dietary Patterns, Feeding Practices, And Developmental Milestone Attainment among Infants (0-12months) Attending Infant Welfare Clinics in Ogun State, Nigeria**

Name of author: **Oluwole, B.O[1*]., Uthman-Akinhami, Y.O[1].**

**Affiliation of authors:** [1]Department of Home Science and Hospitality Management (Food Nutrition and Dietetics), Olabisi Onabanjo University, Ago Iwoye, Ogun State, Nigeria

***Corresponding author:** Oluwoleboluwatife28@gmail.com +2348061990779

**Keywords:** *developmental milestones; dietary patterns; infant feeding; infant welfare clinic*

**Highlight:**

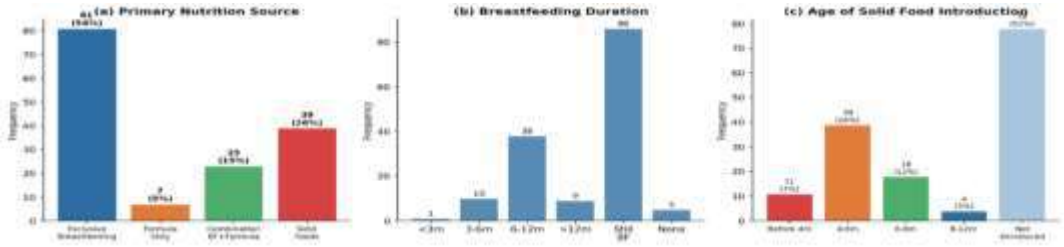
- Dietary pattern was significantly associated with the milestone achievement group
- No significant correlation was found between dietary diversity and anthropometric indicators
- Clinic attendance frequency was significantly associated with milestone achievement

**BACKGROUND AND OBJECTIVES:** Adequate nutrition during the first year of life is fundamental to healthy neurodevelopmental progression [1]. In sub-Saharan Africa, suboptimal infant feeding practices remain prevalent despite established guidelines [2]. However, limited empirical evidence exists linking specific feeding patterns to developmental milestone attainment in clinic-attending infant populations in southwestern Nigeria. This study examined the relationship between dietary patterns, feeding practices, and the attainment of developmental milestones among infants aged 0–12 months attending infant welfare clinics in Ogun State, Nigeria.

**METHODS**: A cross-sectional survey was conducted among 300 mother-infant dyads at two tertiary health institutions in Abeokuta, Ogun State. Data were collected using a structured, interviewer-administered questionnaire covering sociodemographic characteristics, dietary patterns, feeding practices and developmental milestone attainment across seven skill domains. The Developmental Milestone Checklist and the American Academy of Pediatrics (2019) comprised 28 binary items, yielding a composite score of 0–28. Cronbach's alpha for the checklist in this sample was $\alpha = 0.89$, indicating high internal consistency. The Food Frequency Questionnaire (FFQ) was adapted from standard WHO infant feeding assessment tools (WHO, 2008). The FFQ demonstrated acceptable internal consistency in this sample ($\alpha = 0.76$). Anthropometric measurements were assessed using WHO 2006 Child Growth Standards. Chi-square tests of independence were used for categorical associations, and Spearman's rank-order correlation was employed for ordinal data. Statistical significance was set at $p < 0.05$.

**RESULTS AND DISCUSSION**: The mean composite milestone score was 11.70 (SD = 8.61). Dietary pattern was significantly associated with milestone achievement group ($\chi^2 = 58.72$, df = 3, $p < 0.001$), with all infants receiving solid foods falling in the High achievement. Maternal education and occupation were not significantly associated with feeding practices ($p > 0.05$). No significant correlation was found between dietary diversity score and anthropometric indicators (all $p > 0.05$). Clinic attendance frequency was significantly associated with milestone achievement ($\chi^2 = 16.89$, df = 3, $p = 0.001$). The 54.0% exclusive breastfeeding rate, though broadly consistent with national estimates, falls below the national target, suggesting that clinic-based counseling received by 78.0% of caregivers should be intensified and standardized [1, 2].

**Figure 2: Dietary Pattern Characteristics of Infants (N=300)**




**CONCLUSION**: Primary nutrition source and clinic attendance frequency were significantly associated with developmental milestone attainment among infants in Ogun State. These associations are substantially driven by infant age. Findings underscore the importance of age-stratified analyses in future infant developmental research.

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**Sub-Theme: MIYCN as a veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

**Topic: Anthropometric Status, Dietary Diversity, and Infant Welfare Clinic Utilisation among Infants (0-12 months) in Ogun State, Nigeria.**

Name of author: **Uthman-Akinhami, Y.O[1]., Oluwole, B.O[1]***

**Affiliation of authors:** [1]Department of Home Science and Hospitality Management (Food Nutrition and Dietetics), Olabisi Onabanjo University, Ago Iwoye, Ogun State, Nigeria

***Corresponding author:** Oluwoleboluwatife28@gmail.com +2348061990779

**Keywords:** *anthropometric status; malnutrition; dietary diversity; clinic utilisation*

**Highlight:**

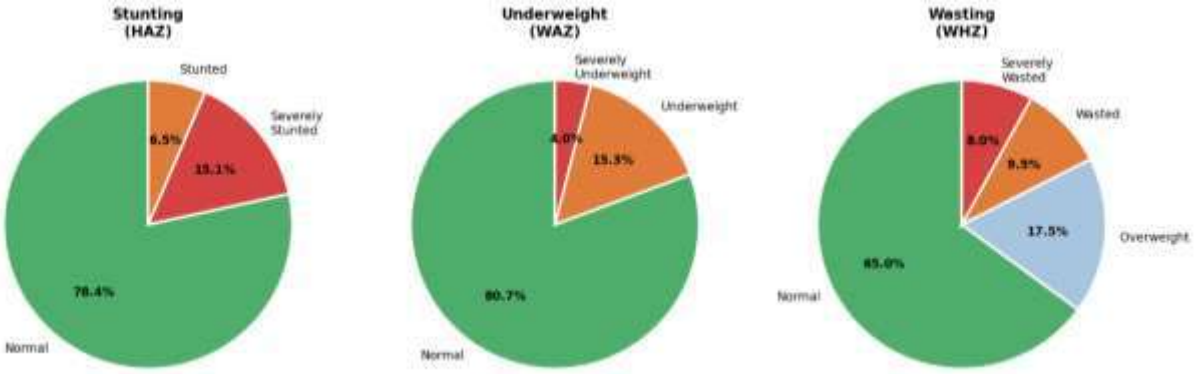
- Stunting prevalence 27.3% exceeds WHO threshold 20% public health significance
- Clinic attendance frequency was significantly associated with developmental milestone achievement
- Dietary diversity score showed no significant association with anthropometric status

**BACKGROUND AND OBJECTIVE**: Malnutrition in its multiple forms stunting, underweight, wasting, and overweight represents a persistent public health challenge in sub-Saharan Africa [1]. Infant welfare clinics serve as primary platforms for nutritional surveillance and growth monitoring; however, the nutritional status of clinic-attending infants in southwestern Nigeria [2], and its relationship to dietary diversity and healthcare utilisation, remains incompletely characterised.This study examined the association between dietary diversity and anthropometric indices, as well as the relationship between clinic attendance frequency and developmental milestone attainment of infants aged 0–12 months attending infant welfare clinics in Ogun State, Nigeria.

**METHODS**: A cross-sectional survey was conducted among 300 mother-infant dyads recruited by multi-stage sampling from the Federal Medical Centre and the State Hospital, Abeokuta, Ogun State. Anthropometric measurements were computed using WHO Anthro software (v3.2.2). Dietary diversity was measured using a Food Frequency Questionnaire (FFQ) adapted from WHO Indicators for Assessing Infant and Young Child Feeding Practices (WHO, 2008), covering eight food groups. Clinic utilisation and caregiver satisfaction were assessed using a structured questionnaire rated on a 5-point Likert scale. The Developmental Milestone Checklist, adapted from American Academy of Paediatrics, comprised 28 binary items. Spearman's rank-order correlation was used to assess DDS-anthropometry relationships, and chi-square tests examined categorical associations. Statistical significance was set at $p < 0.05$.

**RESULTS AND DISCUSSION**: The study population was predominantly female (62.0%), with the largest age group comprising infants aged 0–3 months (45.3%). The mean dietary diversity score was 2.69 (SD = 3.19; range 0–8), indicating markedly limited food group diversity. No significant correlation was found between DDS and any anthropometric indicator (HAZ: rs = −0.000, p = 0.996; WAZ: rs = 0.068, p = 0.411; WHZ: rs = 0.084, p = 0.332). Clinic attendance frequency was significantly associated with developmental milestone achievement group ($\chi^2$ = 16.89, df = 3, p = 0.001). Caregiver satisfaction was generally high, with 62.0% reporting satisfied or very satisfied. Feeding counselling was received by 78.0% of caregivers [2, 3]

**Figure 1: Nutritional Status of Infants Based on WHO Z-score Classifications (N=300)**




**CONCLUSION**: A substantial double burden of malnutrition exists among clinic-attending infants in Ogun State, alongside markedly low dietary diversity. Clinic-based feeding counselling and targeted complementary feeding programmes are urgently needed.

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MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages.

# Association between Socio-Demographic Factors and Nutritional Outcomes Among Children Aged 6–59 Months Attending Ungwan Rimi Primary Health Care, Kaduna State, Nigeria.

*Kure, T.S.[1], Mohammed, H.A.[1], and Olagunju A[1].

[1]Department of Biochemistry, Faculty of Life Sciences, Ahmadu Bello University, Zaria, Kaduna State, Nigeria.

titusskure@gmail.com, +2347068735737

Keywords: Children (6–59 Months), nutritional outcomes, facility based cross sectional study, food insecurity.

## HIGHLIGHT

- MUAC detected 11.3% acute malnutrition despite low Z-score malnutrition
- 68.9% of children failed to meet minimum dietary diversity
- Caregiver education significantly improved child dietary diversity

## BACKGROUND AND OBJECTIVES

Child malnutrition remains a major public health challenge in Nigeria and across sub-Saharan Africa. Despite recent improvements in some nutritional indicators, inadequate dietary diversity, food insecurity, and micronutrient deficiencies continue to threaten child growth and development (1). Socio-demographic characteristics of caregivers have been identified as important determinants of child nutritional outcomes; however, evidence from primary healthcare settings in Kaduna State remains limited (2). This study assessed the relationship between caregiver socio-demographic characteristics and anthropometric nutritional outcomes among children aged 6–59 months attending Ungwan Rimi Primary Health Care Centre, Kaduna State, Nigeria.

## METHOD

A facility-based cross-sectional study was conducted among 106 caregiver–child pairs between January and March 2026. Participants were recruited using convenience sampling. Structured interviewer-administered questionnaires collected information on socio-demographic characteristics, infant and young child feeding practices, dietary diversity, and household food security. Anthropometric measurements including weight, height/length, and mid-upper arm circumference (MUAC) were obtained following WHO guidelines (3). Nutritional status was assessed using WHO Child Growth Standards, while Minimum Dietary Diversity (MDD) was evaluated through a 24-hour dietary recall. Data were analysed using descriptive statistics, Chi-square tests, and Pearson correlation analysis at a significance level of $p < 0.05$.

## RESULTS AND DISCUSSION

The mean age of caregivers was 30.49 ± 6.38 years, and most respondents were mothers (97.2%) and married (94.3%). Anthropometric malnutrition based on Z-scores was relatively low, with wasting, stunting, and underweight prevalence of 4.7%, 2.8%, and 3.8%, respectively. However, MUAC-based acute malnutrition was 11.3%, exceeding the WHO threshold for a serious public health concern. Dietary diversity was poor, with 68.9% of children failing to meet MDD requirements, while 71.7% of households were food insecure.

Caregiver education level was significantly associated with MDD ($\chi^2 = 10.124$, $p = 0.006$), with children of tertiary-educated caregivers more likely to achieve adequate dietary diversity. Household food security was also

significantly associated with MDD ($p < 0.001$). Caregiver age was significantly associated with MUAC status ($\chi^2 = 7.807$, $p = 0.045$) and wasting ($\chi^2 = 12.194$, $p = 0.033$), while caregiver occupation was significantly associated with underweight status ($\chi^2 = 7.331$, $p = 0.046$). Pearson correlation analysis revealed a positive relationship between caregiver education and MDD ($r = 0.304$, $p < 0.01$), whereas child age showed significant negative correlations with MUAC, height-for-age, and weight-for-age scores.

## CONCLUSION AND RECOMMENDATIONS

The study revealed a co-existence of poor dietary diversity, widespread household food insecurity, and elevated MUAC-based acute malnutrition despite relatively low prevalence of Z-score-based malnutrition. Caregiver education, age, and occupation emerged as significant socio-demographic determinants of nutritional outcomes. Strengthening nutrition education, promoting dietary diversification, and expanding MUAC-based screening through primary healthcare services are recommended to address the risk of hidden hunger and improve child nutrition in peri-urban communities.

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**Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Perception and Utilization of Nutrition Information among Pregnant Women Attending Antenatal Clinics in Abeokuta, Ogun State, Nigeria

**Name of Author(s):** Odukoya, P. I.[1], Onabanjo, O. O.[1], Odukoya, K. F.[1], and *Ademiluyi, D. D.[2]

**Affiliation of Author(s):** [1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. [2]Department of Human Nutrition and Dietetics, Federal University of Medicine and Medical Sciences, Abeokuta, Ogun State, Nigeria. *Corresponding author, e-mail: ademiluyikemi1111@gmail.com, +2348032513051

**Keywords:** Nutrition information, active utilization, pregnant women, antenatal care

**Highlights**

- Routine ANC visits provided near-universal nutrition advice (99.5%).
- Active utilization of nutrition information was notably low at 49.0%.
- Socioeconomic barriers drive a critical gap between access and action.

**BACKGROUND AND OBJECTIVES**

Adequate nutrition information during pregnancy is critical for maternal and foetal health outcomes. However, significant gaps persist in how pregnant women perceive, utilize, and adhere to nutrition information in low-resource settings in Nigeria. This study assessed the perception, utilization, adherence, and perceived usefulness of nutrition information among pregnant women attending antenatal clinics in Abeokuta South, Ogun State, Nigeria.

**MATERIALS AND METHOD**

A descriptive cross-sectional survey of 200 purposively selected pregnant women attending five primary healthcare facilities in Abeokuta South Local Government Area was conducted between October and November 2023. A pretested, interviewer-administered structured questionnaire assessed four outcome domains using 10-item binary subscales (0–10), with scores categorized as poor (0–3), moderate (4–6), or good (≥7). Non-parametric tests (Kruskal-Wallis H, Mann-Whitney U with Bonferroni correction) examined group differences across sociodemographic strata. Spearman's rank correlations quantified inter-domain associations.

**RESULTS AND DISCUSSION**

Healthcare providers were the primary and most trusted information source (99.5%). Perception and perceived usefulness were predominantly good (both 79.5%), followed by adherence (66.5%), while utilization was notably lower (49.0% good; 22.5% poor). Significant age-group differences were observed across all four domains (Kruskal-Wallis $H = 10.91–26.29$, all $p \leq 0.004$), with women aged 25–34 years consistently outperforming younger and older cohorts [1]. Education, monthly income, marital status, and gestational trimester were significant predictors; religion was not. All four domains were strongly inter-correlated ($\rho = 0.703–0.842$, all $p < 0.001$).

**CONCLUSION AND RECOMMENDATION**

This study identified a critical access-to-action gap among pregnant women attending antenatal clinics in Abeokuta South, Ogun State, Nigeria: while perception and perceived usefulness of nutrition information were

high (79.5% good), active utilization remained markedly suboptimal (49.0% good), representing the weakest link in the information-to-behaviour pathway. Adherence (66.5% good) occupied an intermediate position, collectively tracing a progressive attenuation from information receipt to dietary practice [2]. The strong inter-correlations among all four domains (Spearman's $\rho = 0.703–0.842$) confirm that perception, utilization, adherence, and perceived usefulness are not isolated constructs but sequential steps in a coherent behavioural chain, with perceived relevance constituting the critical leverage point [3]. Routine integration of one-on-one nutrition counselling from the first antenatal visit as a cost-effective strategy to improve maternal dietary practices and nutritional status throughout pregnancy is recommended.

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**SUB-THEME: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

**TITLE: Workplace Support, Breastfeeding Practices, and Nutritional Status of Lactating Mothers in Ibadan, Southwest Nigeria.**

**Name of Author (s): Folake O. Samuel,[1] Christianah O. Adefi[2] Goodness P. Jesuyemi[3], David O. Oladipo[4]**

**Affliation of Author (s):**

[1-4] Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Nigeria

**Correspondence:** Fosamuel@com.ui.edu.ng adefichristianah@gmail.com

**Keywords: Maternal nutrition, Breastfeeding practices, Workplace support, Body mass index, Lactating mothers.**

**Highlights:** Only 36% of mothers consumed all five key food groups (the "All-5" indicator), indicating that while most women achieved the MDD-W threshold, only a few met a stricter diversity standard. A substantial proportion were overweight (27.5%) and obese (9.375%), while 11.25% were underweight indicating a double burden of malnutrition among the mothers. Perceived work environment support was significantly and positively associated with normal body mass index (BMI) among the mothers.

**Background and Objectives:**

Maternal nutrition in Nigeria is rarely valued in its own right. It tends to receive attention mainly as a means of safeguarding child growth and preventing infant malnutrition, with mothers positioned as a conduit rather than as the subject of concern. [1] This instrumental framing means maternal wellbeing is addressed only insofar as it serves the child, leaving the mother's own nutritional status under-examined once that purpose is presumed met. [1] Lactating mothers require an additional 500 kcal daily alongside increased protein and micronutrient intake, yet two-thirds of Nigerian women fail to meet minimum dietary diversity standards.[3] Unfavorable workplace conditions, including limited maternity leave and lactation breaks, are known to undermine breastfeeding continuity, but their indirect effect on maternal nutritional status as a primary outcome, independent of infant feeding outcomes, remains understudied. [2] This study assessed the association between workplace support, breastfeeding practices, and nutritional status among lactating mothers in Ibadan, with the mother positioned as the primary subject of inquiry.

**Materials and Methods**

A descriptive cross-sectional study was conducted among 160 lactating mothers with infants aged 0 to 6 months attending immunization and breastfeeding clinics at Adeoyo Maternity Teaching Hospital, Ibadan. A structured interviewer-administered questionnaire captured socio-demographic data, workplace conditions, breastfeeding practices (adapted from WHO IYCF indicators), dietary intake (via Diet Quality Questionnaire and Minimum Dietary Diversity for Women), and anthropometric indices. Breastfeeding practices and workplace support were each categorized into three tiers (low, moderate, high). Data were analyzed using SPSS version 20, with chi-square tests assessing associations between workplace support, breastfeeding practices, and BMI.

**Results and Discussion**

Mean respondent age was 29.23 ± 4.42 years, and 59.4% had tertiary education. Over half (51.87%) of mothers had normal BMI, while 27.5% were overweight, 9.375% obese, and 11.25% underweight, reflecting a double burden of malnutrition. Most mothers (56.9%) demonstrated high breastfeeding practices, and 86% met the Minimum Dietary Diversity threshold, though only 36% consumed all five key food groups. Workplace support

was predominantly moderate (51.87%), with 34.37% reporting high support. Workplace support showed a statistically significant association with healthy maternal BMI ($F = 3.976$, $p = 0.021$), while breastfeeding practices alone showed no significant effect on BMI ($p = 0.434$).

**Table 1**

| Variable | N | % |
|---|---|---|
| Age (years), mean ± SD | 160 | 29.23 ± 4.42 |
| *Level of Education* | | |
| Tertiary | 95 | 59.4 |
| Non-tertiary | 65 | 40.6 |
| *Maternal BMI category* | | |
| Underweight | 18 | 11.25 |
| Normal weight | 83 | 51.87 |
| Overweight | 44 | 27.5 |
| Obese | 15 | 9.37 |
| *Breastfeeding practice* | | |
| High | 91 | 56.9 |
| Medium | 53 | 33.1 |
| Low/Suboptimal | 16 | 10 |
| *Dietary diversity* | | |
| Met MDD threshold (≥5 food groups) | 138 | 86.25 |
| Consumed all five key food groups | 58 | 36.25 |
| *Workplace support* | | |
| High | 55 | 34.37 |
| Moderate | 83 | 51.87 |
| Low | 22 | 13.75 |

## Conclusion and Recommendations

Workplace support, rather than breastfeeding practices alone, was significantly associated with healthy BMI among lactating mothers, identifying it as a modifiable structural factor in maternal nutrition outcomes. [2] Strengthening lactation-friendly workplace policies, including designated breaks and private expression spaces,

in alignment with Nigeria's National Policy on Infant and Young Child Feeding, could meaningfully improve maternal nutritional outcomes during the postpartum period and even redress the double burden of malnutrition during the postpartum period.[3]

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**SUB THEME 2: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages**

## Dietary Behaviours, Consumption Pattern and Nutritional Status of Preschool Children in Owo Metropolis

[*1]Mustapha, R. A., and [1]Adedayo, E. O

[1]Department of Nutrition and Dietetics, Faculty of Applied Sciences, Rufus Giwa Polytechnic, Owo Ondo State Nigeria

*Corresponding author E-mail: musternd@gmail.com; rasaqalaba_mustapha@rugipo.edu.ng

Keywords: Dietary behaviours, Wasting, Stunting, Preschool Children

### Background and Objective

At preschool period, children develop their eating skills, form independent eating behaviors and begin to have definite preferences toward food. Negative dietary habit formed at this stage consequently lead to induced lifestyle resulting to chronic non-communicable diseases at adulthood. Poor and abnormal dietary pattern is an important public health concern particularly among children. Negative dietary behaviours and poor consumption pattern among preschool children particularly from lower socio-economic status had been linked to hinder their growth and predisposes these children to malnutrition (Sim et al., 2019; Angula et al., 2024). Nutritional status of children is one of the major predictors of child survival and presently Nigeria is ranked among the top ten countries with the highest rate of malnutrition globally (Nwosu et al, 2020). Therefore, this research assessed the dietary behaviours, consumption pattern and nutritional status of preschool children between ages 3-5 years in Owo metropolis

### Methodology:

The study was a cross sectional survey of children aged 3-5 years in Owo metropolis. Two hundred mothers that participated in this study were randomly selected among mothers with children aged 3-5 years attending four selected health centers (Isuada, Oke-Mapo, Ehin-Ogbe and Okedogbon).Semi-structured questionnaire were used to obtain socio-demographic information, dietary behaviors and food consumption pattern of children using FFQ. Anthropometric measurement such as MUAC, heights and, weight were taking to assessed nutritional status of children using WHO Anthro-PLUS. Ethical clearance was obtained from, Ondo State, Ministry of Health while informed consent of mothers were obtained prior data collection. Data were analyzed using SPSS and presented with descriptive statistic such as mean, percentage frequency. Nutritional status was analyzed using EPI-Info-Statistical package where height for age Z-score (HAZ), weight for age Z-score (WAZ) and weight for height Z-score (WHZ) were used to classify children according to degree of nutritional status.

### Results and Discussion:

The children dietary behavioral pattern is normal, although a few percentages among the children were following irregular dietary behavioral pattern. The nutritional status of the children reveals that 37.5 % had normal Weight for Length while 18.5 % were severely wasted. Furthermore, the study shows that less than half (35 %) of the children had normal Length for Age, where as32% of them were mildly stunted. Additionally, a slightly higher proportion of children fell within the moderately stunted and severely stunted categories

indicating chronic undernutrition. These findings align with the study by Angular et al. (2024), which also reported a high prevalence of stunting and underweight.

**Conclusion and Recommendation:** The children exhibited a normal dietary behaviour**,** the prevalence of wasting and stunting remained notably high among them. **T**his indicates that factors beyond dietary behaviour such as limited dietary diversity or inadequate nutrient intake, may be contributing to undernutrition. Therefore, improving access to diversified diets and nutrition education can mitigate high prevalence of malnutrition among the children.

**Table 1: Pattern of Dietary Behaviours of Respondents.**

| **Variables** | **Most Times** | | **Sometimes** | | **No** | |
|---|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **n** | **%** |
| Does your child accept varieties of food? | 182 | 91.5 | 16 | 8.0 | 1 | 0.5 |
| Does your child chew/swallow food with mouth closed? | 174 | 87.4 | 16 | 8.0 | 9 | 4.5 |
| Does your child cry when hungry? | 192 | 87.5 | 6 | 3.0 | 1 | 0.5 |
| Does your child cry when food is offered? | 154 | 77.4 | 13 | 6.5 | 32 | 16.1 |
| Does your child refuse to accept/eat food? | 157 | 78.4 | 16 | 8.0 | 27 | 13.6 |
| Does your child remain seated during meal? | 165 | 82.5 | 30 | 15.1 | 4 | 2.0 |
| Does your child sleep off after eating? | 162 | 81.4 | 28 | 14.1 | 9 | 4.5 |
| Does your child eats moderately or at Normal pace | 163 | 81.9 | 36 | 18.1 | 0 | 0.0 |
| Does your child eat and drink quietly? | 165 | 82.9 | 34 | 17.1 | 0 | 0.0 |
| Is your child allergic to certain food(s)? | 155 | 77.9 | 1 | 0.5 | 1 | 0.5 |

**Table 2: NUTRITIONAL STATUS OF THE RESPONDENTS**

| **Variables** | **Male No (%)** | **Female No (%)** | **Total No (%)** |
|---|---|---|---|
| **Weight for Height(WHZ)** | | | |
| Severely Wasted | 19(9.5) | 18(9.0) | 37(18.5) |
| Moderately Wasted | 19(9.5) | 20(10.0) | 39(19.5) |
| Mildly Wasted | 20(10.0) | 29(14.5) | 49(24.5) |
| Normal | 27(13.5) | 48(24.0) | 75(37.5) |
| **Length for Age(HAZ)** | | | |
| Severely stunted | 20(10.0) | 18(9.0) | 38(19) |
| Moderately stunted | 11(5.5) | 17(8.5) | 28(14) |
| Mildly stunted | 27(13.5) | 37(18.5) | 64(32) |

| | | | |
|---|---|---|---|
| Normal | 27(13.5) | 43(21.5) | 70(35) |
| **Weight for Age(WAZ)** | 7(3.5) | 4(2.0) | 11(5.5) |
| Severely underweight | 4(2.0) | 4(2.0) | 8(4) |
| Moderately underweight | 11(5.5) | 17(3.5) | 28(14) |
| Mildly underweight | 63(31.5) | 97(48.5) | 160(80) |
| Normal | | | |
| **MUAC** | | | |
| Malnourished | 12(6.0) | 16(37.0) | 28(14) |
| Normal | 66(33.0) | 106(53.0) | 172(86) |

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**Sub-theme:** MIYCN as a veritable framework for delivering nutrition-sensitive and specific interventions across life stages.

**Title:** Maternal Food Purchasing Behaviour as a Predictor of Nutritional Status Among Under-Five Children in Egbeda and Ibadan North-East LGAs, Oyo State, Nigeria.

**Name of Author:** *Ibitayo B.B, and Samuel J.O.

**Affiliation of Author:** Department of Dietetics, University College Hospital, Ibadan, Oyo State, Nigeria.

***Corresponding Author's email and phone no.:** blessingibitayo@gmail.com; +2348141253225

**Keywords:** Maternal food purchasing behaviour; nutritional status; under-five children; stunting and acute malnutrition.

**Highlights**

- Stunting (63.3%) and acute malnutrition (70.0%) were highly prevalent
- Fruit and vegetable intake reduced odds of stunting and malnutrition
- Food purchasing behaviour linked to maternal education, occupation, income

**BACKGROUND AND OBJECTIVES**: Maternal food purchasing behaviour is a key determinant of dietary quality and child nutritional outcomes in low- and middle-income countries [1]. Despite the centrality of household food procurement decisions to child feeding practices, limited evidence exists on how specific purchasing behaviours predict nutritional status among under-five children in urban Nigeria. This study assessed maternal food purchasing behaviour and its association with nutritional status among under-five children in Egbeda and Ibadan-North East Local Government Areas of Oyo State.

**MATERIALS AND METHOD:** A cross-sectional study design was employed, incorporating both descriptive and inferential statistical approaches. A multistage sampling technique was used to recruit eighty (80) mothers of under-five children. Data were collected through structured questionnaires and anthropometric assessments. Variables captured included socio-demographic and socio-economic characteristics, maternal food purchasing behaviour, and child nutritional status. Data were analysed using IBM SPSS version 30.0. Anthropometric data for under-five children were analysed using WHO Anthro (version 3.2.2.1) to generate standardised z-scores for height-for-age, weight-for-age, and weight-for-height, which classified stunting, underweight, and wasting [2]. Associations were assessed using Chi-square tests, and multivariable logistic regression analyses were adjusted for maternal education, occupation, monthly household income, and parity. Ethical approval was granted by Oyo State Ministry of Health Ethical Review Committee (NHREC/OYOSHRIEC/10/11/22).

**RESULTS AND DISCUSSION:** Most mothers (55.0%) were aged 21-30 years (mean age: 29.6 ± 5.6 years); the majority were married (80.0%), had secondary education (58.8%), were self-employed or engaged in trade-based occupations (57.5%), and reported monthly household incomes above ₦60,000 (67.5%). Anthropometric assessment revealed a high prevalence of stunting (63.3%) and acute malnutrition (70.0%) among the under-five children. Chi-square analysis showed that food purchasing behaviour was significantly associated with maternal education, occupation, and household income ($p < 0.05$). Logistic regression analysis demonstrated that fruit and vegetable consumption was independently associated with reduced odds of stunting (AOR = 0.18; 95% CI: 0.06-0.54) and acute malnutrition (AOR = 0.10; 95% CI: 0.03-0.31). No significant associations were observed for wasting, underweight, or thinness. This finding is consistent with evidence that chronic undernutrition in early childhood often reflects prolonged nutritional deprivation, with potential implications for linear growth and long-term child development [3,4].

**CONCLUSION AND RECOMMENDATION:** Maternal food purchasing behaviour significantly predicted nutritional status among under-five children in the study area. Fruit and vegetable purchasing and consumption independently reduced the odds of stunting and acute malnutrition. Sociodemographic factors including education, occupation, and income were key determinants of purchasing behaviour. Community-based nutrition education, targeted food procurement programmes, and policies that improve household purchasing power are recommended to improve the nutritional status of under-five children.

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**Theme/Sub-theme**: DELIVERING BETTER NUTRITION FOR ALL: connecting dots across life-cycles, systems and sectors/ MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages.

**Title: Assessment of Knowledge and Utilization of Ante-natal Care Services among *Primigravida* Women of Child Bearing Age in Angwan Gade Community, Kuje Area Council, Abuja.**

**Authors**: *Ucheh, B.I, [1]Department of Public Health Science (NOUN) iucheh@noun.edu.ng 08036840693; Otunola, GA. [2]Department of Chemistry, Faculty of Health Science, National Open University of Nigeria (NOUN), Nigeria; Ubosi, N.I [3] Department of Public Health Science, Faculty of Health Science, National Open University of Nigeria (NOUN); Onah, P.O [4] Department of Public Health Science, Faculty of Health Science, National Open University of Nigeria (NOUN); Idris, H.A [5] Primary Health Care Centre, Kuje; Onime L. [6]SPGS NOUN

**Keywords**: Utilization, Ante-natal Care, Primigravida, Kuje

**Highlights**

- Ante-natal care (ANC) services were sub-optimal
- Late registration for ANC, mostly at second trimester and infrequent visits were evident
- Constraints include financial/economic, distance to health facilities and perceived negative attitude of health workers

**Background/Objectives**: Maternal health care continues to be critical in global health particularly in developing countries [1]. Access to antenatal care services offer women of reproductive age necessary medical attention, education and preventive interventions [2]. This study assessed the knowledge and factors influencing utilization of antenatal care by Primigravida women in Kuje, a peri-urban area.

**Methodology**: A descriptive-cross-sectional survey on 200 women aged 15-49 years was used for the study [3]. Purposive sampling was used to identify eligible respondents, simple random sampling to select respondents from the eligibility list, while Structured Questionnaires, were used to collect data and Ethical Clearance was obtained from appropriate authorities.

**Results and Discussion**

**Table 1: Utilization of ANC during Pregnancy in Primigravida women, Kuje**

| Antenatal Seeking Behavior | Category | Frequency(n) | Percentage (%) |
|---|---|---|---|
| Registration for antenatal clinic | Yes | 160 | 80 |
| | No | 40 | 20 |
| Trimester of First Registration | 1st | 40 | 25.0 |
| | 2nd | 95 | 59.4 |
| Number of Attendance so far | 3rd | 25 | 15.6 |
| Major ANC Service Provider | Once | 20 | 12.5 |
| | 2-3times | 50 | 31.3 |
| | >4times | 90 | 56.2 |
| | Government Health Care Centre | 110 | 55 |
| | Private Clinics | 40 | 20 |
| | Traditional Birth Attendants | 15 | 7.5 |
| | Patent Medicine Store | 35 | 17.5 |
| **Total** | | **200** | **100** |

**Conclusion and Recommendations**: General awareness of ANC was appreciably high, but there are gaps in cultural knowledge regarding recommended timing for initiating ANC. Utilization of ANC was also suboptimal due to late registration and insufficient number of visits. Insufficient operational knowledge on early initiation of visits, economic and socio-cultural barriers, as well as high cost were major barriers to utilization of ANC in Kuje. It is recommended that all stakeholders, Policy makers, Healthcare providers, community and family members should be given increased awareness.

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**Theme/sub theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Development and Validation of Nutrition Education Tools on Dietary Management of Osteoporosis among Elderly

**Name of Author (s):** Ozibe G.T. [1], Abdulsalami A.O. [1], and Samuel J.O. [1]

**Affiliation of Author (s):** [1]Department of Dietetics, University College Hospital, Ibadan, Oyo State, Nigeria.

Corresponding author email: giftozibe@gmail.com, +2348132868352

**Keywords:** Osteoporosis, Elderly, Nutrition Education, Dietary Management

**Highlights**

- Nutrition education tools for osteoporosis management were successfully developed and validated
- Over 90% expert agreement on suitability, clarity, and usability of the materials

**BACKGROUND AND OBJECTIVES:**

Osteoporosis is a major public health concern among the elderly, characterized by reduced bone mass and increased risk of fractures (Ugwu and Ene 2025). Adequate intake of calcium, vitamin D, and adoption of healthy dietary practices are essential for its prevention and management (Rizzoli and Chevalley 2024). However, studies in Nigeria have reported low awareness and poor preventive practices among older adults, alongside limited availability of culturally appropriate nutrition education materials (Ugwu and Ene 2025). This study aimed to develop and validate nutrition education tools for the dietary management of osteoporosis among the elderly.

**MATERIALS AND METHODS:**

A formative research design was adopted for this study. Nutrition education tools, including a flipchart and a trifold pamphlet, were developed based on existing literature, dietary guidelines, and expert recommendations. Content validity was assessed by a panel of registered dietitians using a structured questionnaire evaluating relevance, clarity, accuracy, and appropriateness (Polit and Beck, 2006). Face validity and usability were also evaluated by experts. Data were analyzed using descriptive statistics and content validity indices, including item-level content validity index (I-CVI) and scale-level content validity index (S-CVI) (Lynn 1986).

**RESULT AND DISCUSSION:**

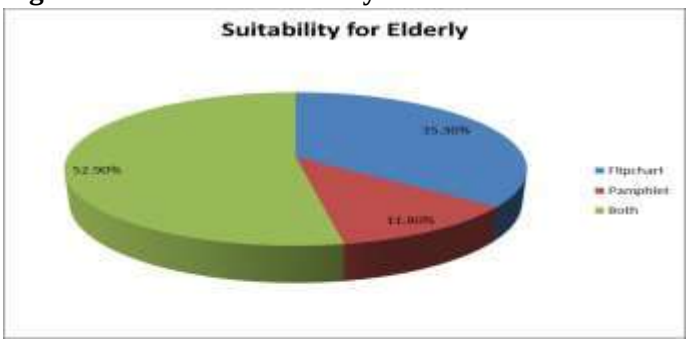
The study showed that the developed osteoporosis nutrition education tools had high content validity across all domains. Most experts rated the content as highly relevant (88.2%), very clear (82.4%), very accurate (70.6%), and highly appropriate (76.5%), with no negative ratings recorded. All items met acceptable validity thresholds, with most achieving perfect I-CVI scores (1.00). As shown in Table 1, The scale-level indices were also high: relevance (0.99), clarity (0.96), accuracy (0.93), and appropriateness (0.96).

Face validity findings indicated strong acceptance, with 94.1% agreeing the materials were relevant and 100% confirming suitability for the target audience. As shown in figure 1 over half (52.9%) preferred both the flipchart and pamphlet, while others preferred either the flipchart (35.3%) or pamphlet (11.8%). Overall, the tools were considered appropriate and effective for osteoporosis nutrition education among the elderly.

**Table 1: Result of the Scale-Level Content Validity Index**

| Content | S-CVI |
|---|---|
| **Relevance** | 0.99 |
| **Clarity** | 0.96 |
| **Accuracy** | 0.93 |
| **Appropriateness** | 0.96 |

**Figure 1: Suitability of Tools for Elderly**




## CONCLUSION AND RECOMMENDATION

It was concluded that the developed flipchart and trifold pamphlet for osteoporosis nutrition education among the elderly showed high content validity and strong face validity, indicating that the materials are appropriate, acceptable, and suitable for use. It is recommended that the tools be adopted in hospitals and community health settings for nutrition education on osteoporosis among the elderly.

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| | |
|---|---|
| **Theme:** | Delivering better Nutrition for All: Connecting the Dots across Life Cycle, Systems, & Sectors. |
| **Sub-Theme:** | MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages |
| **Title:** | Maternal Preparedness for Complementary Feeding: A Comparative Study of Primigravida and Multigravida Mothers in Ibadan |
| **Name of Author (s):** | *Eyinla, T. E[1], Bayo- Ajayi, P.J[2], and Aregbesola, R. O[3] |
| **Affiliation of Authors**: | [1] Department of Human Nutrition and Dietetics, University of Ibadan<br>[2] Department of Human Nutrition and Dietetics, University of Ibadan<br>[3] Department of Human Nutrition and Dietetics, University of Ibadan<br>teeyinla @com. ui.edu. ng, +2348068467771 |
| **Keywords:** | Complementary Feeding, Primigravida, Multigravida, Maternal Preparedness |

**Highlights**

- Primigravida mothers were less prepared for complementary feeding than multigravida mothers.
- Maternal knowledge, Education, income and support system are significant predictors for preparedness.


**BACKGROUND AND OBJECTI VE:**

Appropriate Complementary feeding is essential for child nutrition during the first two years of life. However, first-time mothers often lack the experience and support needed to practice optimal complementary feeding thereby compromising their infant nutrition (Junejo et al., 2019). The aim of this study was to assess maternal preparedness for complementary feeding, among Primigravida and multigravida mothers in Ibadan.

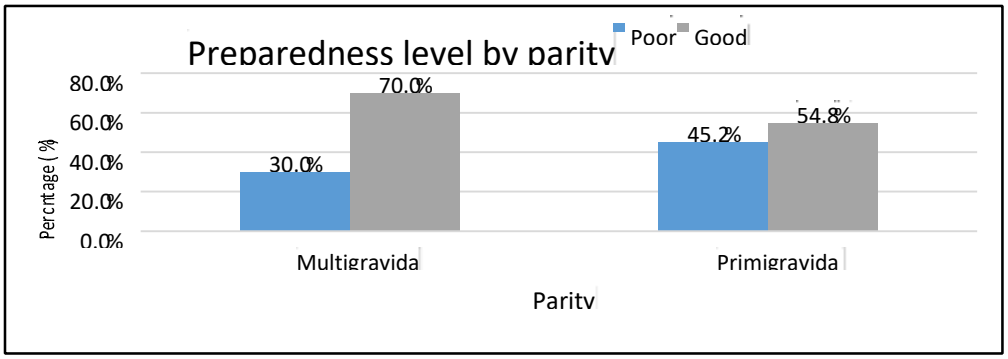
**MATERI ALS AND METHOD:**

A crosssectional study involving 510 mothers of which 313 were multigravida and 197 were primigravida. Data were collected using structured questionnaires covering socio-demographic characteristics, Knowledge, and preparedness for complementary feeding. Data were analyzed using descriptive statistics, and logistic regression to identify predictors of preparedness.

**RESULTS AND DISCUSSI ON:**

The results showed that preparedness was significantly higher among multigravida mothers than primigravida mothers (70% vs 54.8%, P = 0.001) indicating that first-time mothers were less prepared for complementary feeding practices. This difference may be attributed to previous maternal experience and exposure to child-feeding practices among multigravida mothers.

**Figure 1: Preparedness Level by Parity**




Factors such as Knowledge, education, income and support system significantly predicts maternal preparedness ($p < 0.05$) for complementary feeding

**CONCLUSION AND RECOMMENDATI ONS:**

Primigravida mothers were significantly less prepared for complementary feeding than multigravida mothers due to limited experience and exposure. Improving maternal preparedness for complementary feeding therefore requires targeted interventions, for first-time mothers to enhance maternal preparedness and improve infant feeding practices.

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**Theme/Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Impact of Integrated Micronutrient Supplementation and MIYCN During the 2025 Maternal, Newborn, and Child Health Week (MNCHW) Campaign among Children and Pregnant Women Attending Primary Healthcare Facilities across 23 LGAs in Kaduna State, Nigeria

**Name of Author(s):** *Muhammad Tukur. [1]; Chinwe Ezife. [2]; Prof. Bello Yusuf Jamoh. [3] , Ahmad Mahmoud[1], Adamu Muhammad Usman[2], Ramatu Musa Haruna[1].

**Affiliations:** [1]Department of Nutrition Services, Kaduna State Primary Health Care Board, Kaduna State, Nigeria; [2]UNICEF Kaduna Field Office, Kaduna State, Nigeria; [3]Office of the Executive Secretary, Kaduna State Primary Health Care Board, Kaduna State, Nigeria.

***Corresponding author: Muhammad Tukur** e-mail: mabuahmad1978@gmail.com, +2348035562762

**Keywords:** Micronutrient deficiencies; Vitamin A supplementation; Multiple micronutrient supplementation (MMS); MIYCN.

**Highlights:**

• Vitamin A reached 1,525,798 children, achieving 80% coverage.

• MUAC screening reached 1,512,528 children, achieving 79% coverage.

• Multiple Micronutrient Supplementation (MMS) improve maternal nutrition and reduce micronutrients deficiencies.

**BACKGROUND AND OBJECTIVES:**

Maternal, Infant and Young Child Nutrition (MIYCN) supports optimal nutrition through maternal dietary counselling, breastfeeding, complementary feeding, micronutrient supplementation and nutrition education. During the December 2025 MNCHW campaign, Kaduna State Government, in collaboration with UNICEF, integrated vitamin A supplementation, multiple micronutrient supplementation (MMS), iron–folic acid (IFA), nutrition screening and other MIYCN services through primary healthcare facilities. However, evidence on statewide performance of the integrated package was limited. This study assessed coverage and implementation gaps for integrated micronutrient and MIYCN interventions among pregnant women and children across all 23 LGAs of Kaduna State.

**MATERIALS AND METHOD:**

A descriptive cross-sectional analysis of routine programme data from the December 2025 MNCHW campaign was conducted. Data were obtained from the Kaduna State DHIS2/MNCHW reporting system, using routine campaign reporting records as the data collection instrument. The analysis included reported programme data from all 23 LGAs; because this was a statewide secondary-data analysis, no individual participant sampling was performed. Coverage was summarized using frequencies and percentages and compared with the 80% campaign target. This Study involved secondary analysis of routinely collected, aggregated MNCHW program data retrieved from the Kaduna State DHIS2 reporting platform. The analysis used program-level data without individual identifiers or personally identifiable information. Accordingly, no individual participant was contacted or enrolled, and informed consent was not applicable. The use of the data for analysis was conducted with authorization from the relevant program/data custodians, in accordance with applicable institutional and data-governance requirements. Where required, the study submitted for ethical review and / or exemption in accordance with the policies of Kaduna State Primary Healthcare Board research ethics committee.

## RESULTS AND DISCUSSION:

Vitamin A supplementation and MUAC screening achieved near-target or target performance, whereas maternal micronutrient interventions and deworming were substantially below target. A total of 1,525,798 children aged 6–59 months received vitamin A (80% coverage), comprising 192,151 children aged 6–11 months (90%) and 1,333,647 aged 12–59 months (78%). MUAC screening reached 1,512,528 children (79%). In contrast, reported coverage was 19% for deworming (319,631 children), 12% for ANC MMS (65,267), 15% for ANC IFA (80,841), and 11% for ANC IPT-SP (56,016). Reported implementation constraints included commodity stock-outs, inadequate human resources, weak logistics support and insecurity in hard-to-reach communities. These findings indicate that integrated campaign delivery can achieve strong child-focused coverage, but maternal services require stronger commodity availability, service uptake, community mobilization and implementation support.

**Table 1:** Percentage Coverage of Micronutrient Supplementation and MIYCN during MNCHW 2025 in Kaduna State.

| Intervention | Target Population | Beneficiaries Reached | Coverage (%) | 95% Confidence Interval |
|---|---|---|---|---|
| Vitamin A supplementation | 1,907,248 | 1,525,798 | 80.0 | 79.9–80.1 |
| MUAC screening | 1,914,593 | 1,512,528 | 79.0 | 78.9–79.1 |
| Multiple Micronutrient Supplementation | 543,892 | 65,267 | 12.0 | 11.9–12.1 |
| Iron–Folic Acid supplementation | 538,940 | 80,841 | 15.0 | 14.9–15.1 |
| IPT-SP | 509,236 | 56,016 | 11.0 | 10.9–11.1 |
| Deworming | 1,682,268 | 319,631 | 19.0 | 18.9–19.1 |

## CONCLUSION AND RECOMMENDATIONS:

Integrated MNCHW delivery achieved the state target for vitamin A supplementation and near-target MUAC screening, but coverage of deworming and maternal micronutrient services remained low. The Kaduna State nutrition programme should strengthen forecasting and timely distribution of commodities, improve routine monitoring of maternal services, intensify community mobilization, address human-resource and logistics gaps, and strengthen implementation in hard-to-reach and insecure communities.

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**Title:** Knowledge of the Effects of Malnutrition among Pregnant Women Attending Antenatal Clinic at Central Hospital, Benin City, Nigeria

Ayankoso L.T.[1]*, Amanesi A[1], Ojei O.O[1], Efeobhokhan E.O[1].

[1]Department of General Studies, Edo State College of Nursing Sciences, Benin City

**Correspondence:** mail; lydiaayankoso@gmail.com tel; +2347032261611

**Keywords:** Malnutrition, Pregnancy, Knowledge, Antenatal Care

**Highlights**

6. Most respondents demonstrated adequate knowledge of malnutrition in pregnancy.
7. Healthcare providers and antenatal classes were major sources of nutrition information.
8. Nutrition education during antenatal care positively influenced dietary choices.

## BACKGROUND AND OBJECTIVES

Malnutrition during pregnancy remains a major public health concern, contributing to adverse maternal and fetal outcomes. Adequate nutritional knowledge is essential for promoting healthy pregnancy outcomes and preventing nutrition-related complications [1]. This study assessed pregnant women's knowledge of the effects of malnutrition among antenatal clinic attendees at Central Hospital, Benin City, Edo State. It also examined their sources of nutrition information and the role of healthcare providers in delivering nutrition education.

## MATERIALS AND METHODS

A descriptive cross-sectional study was conducted among pregnant women attending the antenatal clinic at Central Hospital, Benin City. Sample size was determined using Cochran's formula with Z = 1.96, and e = 0.05 p = 11.9% [2]. After adding 10% for non-response, 177 participants were recruited, of which 170 returned completed questionnaires. Data were analyzed using descriptive statistics in SPSS version 24.

## RESULTS AND DISCUSSION

The respondents had a mean age of 30.9 years; most were aged 26–33 years (35.3%), married (85.3%), and self-employed (41.2%). Overall, 71.3% demonstrated adequate knowledge of the effects of malnutrition during pregnancy. Most recognized its association with low birth weight (73.5%), impaired fetal brain development (77.6%), delivery complications (82.4%), and maternal anemia (70.6%). Healthcare providers (70.6%) and antenatal classes (52.9%) were the major sources of nutrition information.

**Table 1: Knowledge of the Effects of Malnutrition among Pregnant Women (N = 170)**

| Study Variable/Outcome | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age of respondents (years)** | | |
| 18–25 | 50 | 29.4 |
| 26–33 | 60 | 35.3 |
| 34–41 | 40 | 23.5 |

| Study Variable/Outcome | Frequency (n) | Percentage (%) |
|---|---|---|
| ≥42 | 20 | 11.8 |
| **Mean age** | **30.9 years** | |
| **Level of knowledge of effects of malnutrition** | | |
| Adequate knowledge | 121 | 71.3 |
| Moderate knowledge | 26 | 15.3 |
| Poor knowledge | 23 | 13.4 |
| **Knowledge of specific effects of malnutrition** | | |
| Low birth weight | 125 | 73.5 |
| Impaired fetal brain development | 132 | 77.6 |
| Delivery complications | 140 | 82.4 |
| Maternal anaemia | 120 | 70.6 |
| **Sources of nutrition information** | | |
| Healthcare providers | 120 | 70.6 |
| Antenatal classes | 90 | 52.9 |
| Pharmacists | 78 | 45.9 |
| Radio programmes | 66 | 38.8 |

## CONCLUSION AND RECOMMENDATIONS

Pregnant women attending antenatal clinic at Central Hospital, Benin City demonstrated adequate knowledge of the effects of malnutrition during pregnancy. Healthcare providers play a vital role in promoting nutritional awareness. Strengthening nutrition education and integrating regular nutrition counselling into antenatal care can further improve maternal knowledge and pregnancy outcomes.

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**SUB-THEME:** MIYCN as a veritable framework for Delivering Nutrition-sensitive and specific interventions across life stages

**Title**: Maternal Nutrition Knowledge, Child Feeding Practices, and Nutritional Status of Under-Five Children in Akinyele Local Government Area, Ibadan, Nigeria

**Author**: Omotosho K.B

**Affiliate university:** Department of Human Nutrition and Dietetics, University of Ibadan

Keywords: Maternal nutrition knowledge, Child feeding practices, Complementary feeding, Under-five children.

Highlights: A high burden of malnutrition exists among under-five children in Akinyele LGA.

Maternal education, occupation, and religion significantly influenced knowledge of complementary feeding.

No significant association was found between maternal nutrition knowledge, child-feeding practices, and under-five nutritional status.

Background/Objective: Mothers play a critical role in providing adequate care and ensuring optimal nutrition for children during the first five years of life. Maternal nutrition knowledge influences infant and young child feeding practices, which are essential for preventing childhood malnutrition [1]. This study assessed maternal nutrition knowledge, child feeding practices, and the nutritional status of under-five children in Akinyele Local Government Area, Ibadan.

Methodology:A descriptive cross-sectional study was conducted among 394 mother-child pairs. Firstly, six primary healthcare centres (PHCs) were randomly selected from all PHCs in Akinyele Local Government Area, after which eligible mother-child pairs attending the selected PHCs were recruited randomly until the required sample size of 394 was attained.

Data on maternal nutrition knowledge and child feeding practices were collected using a semi-structured questionnaire adapted from WHO Infant and young child feeding indicators [2]. Anthropometric measurements of the children were obtained, and nutritional status was assessed using WHO Anthro software to determine stunting, wasting, and underweight indices[3]. Data were analysed using SPSS version 20. Descriptive statistics and Chi-square tests were performed, with statistical significance set at $p < 0.05$.

Results: Although 81.4% of mothers had good knowledge of breastfeeding and complementary feeding, 53.2% had poor knowledge of appropriate complementary foods for children aged 6–23 months, while 59% demonstrated poor child-feeding practices. The prevalence of stunting, wasting, and underweight among the children was 48%, 17%, and 31%, respectively. Maternal education, occupation, and religion were significantly associated with knowledge of complementary foods ($p < 0.05$). However, no significant association was observed between maternal nutrition knowledge, child-feeding practices, and the nutritional status of under-five children.

Conclusion: Despite relatively good maternal knowledge of breastfeeding and complementary feeding, a high burden of malnutrition persists among under-five children in Akinyele Local Government Area. However, interventions should extend beyond education to address contextual barriers affecting optimal child-feeding

practices.while strengthening MIYCN counselling and support through primary healthcare centres could improve child nutritional outcomes.

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**MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

## FOOD SAFETY KNOWLEDGE AND PRACTICES OF MOTHERS WITH CHILDREN (6-23 months) ATTENDING PRIMARY HEALTH CARE CENTRES IN NSUKKA URBAN AREA

Onuoha, N. F., *Nsofor L. D. & Onoja. U. S.

Department of Nutrition and Dietetics, University of Nigeria Nsukka

*Corresponding author, e-mail: laura.nsofor@unn.edu.ng, +2347038200006

**Keywords:** Food safety knowledge, food safety practice, mothers, hand hygiene

**Highlights:**

- Majority of the mothers demonstrated a fair to good knowledge of food safety.
- Maternal food safety knowledge was significantly associated ($p < 0.05$) with food-related hand hygiene practices.

**Background and Objectives:** In domestic settings, mothers play a critical role in ensuring food safety through meal preparation and child feeding practices, which is essential for protecting infants and young children, who are especially vulnerable to foodborne illnesses [1].This study assessed the food safety knowledge and practices of mothers with children (6-23) months attending primary health care centres in Nsukka urban.

**Materials and Method:** The study utilized a cross-sectional survey design. A sample of 320 mothers were randomly selected from six (6) primary health care centres within the study area. A semi-structured interviewer administered questionnaire was used to collect information on mother's food safety knowledge and practices. Data were coded and analysed using the computer software package, IBM SPSS Statistics, version 23.0. Results were presented in frequencies and percentages. Chi square was used to test for relationship among variables. Significance was accepted at $P < 0.05$.

**Results and Discussion:** The results demonstrated that 40.3% of the mothers had good knowledge, 53.4% had fair knowledge and 6.3% had poor knowledge of food safety. Food safety knowledge was significantly associated with the practice of keeping raw meat, fish, or eggs together with cooked foods, fruits and vegetables ($\chi^2 = 34.578$, $p < 0.001$), handling of children's leftover food ($\chi^2 = 22.794$, $p = 0.001$) and bottle-feeding practices ($\chi^2 = 20.471$, $p < 0.001$).

**Table 1: Relationship between mother's food safety knowledge and their hand hygiene practices at critical times**

| Variables | Food safety knowledge level | | | | Chi-square($\chi^2$) | P-value |
|---|---|---|---|---|---|---|
| **Most frequent ways they clean their hands** | Good knowledge | Fair knowledge | Poor knowledge | Total | | |
| **Before food preparation** | | | | | 13.216 | .010** |
| **With only water** | 19(14.7) | 52(30.4) | 7(35.0) | 78(24.4) | | |
| **With soap and water** | 110(85.3) | 117(68.4) | 13(65.0) | 240(75.0) | | |
| **With a clean cloth** | 0(0.0) | 2(1.2) | 0(0.0) | 2(0.6) | | |
| **Total** | 129(100.0) | 171(100.0) | 20(100.0) | 320(100.0) | | |
| **Before feeding the child** | | | | | 30.602 | .000** |
| **With only water** | 30(23.3) | 82(48.0) | 14(70.0) | 126(39.4) | | |
| **With soap and water** | 98(76.0) | 87(50.9) | 6(30.0) | 191(59.7) | | |
| **With sanitizer** | 1(0.8) | 0(0.0) | 0(0.0) | 1(0.3) | | |
| **With a clean cloth** | 0(0.0) | 2(1.2) | 0(0.0) | 2(0.6) | | |
| **Total** | 129(100.0) | 171(100.0) | 20(100.0) | 320(100.0) | | |
| **After touching raw egg, meat or fish** | | | | | 20.117 | .000** |
| **With only water** | 22(17.1) | 61(35.7) | 11(55.0) | 94(29.4) | | |
| **With soap and water** | 107(82.9) | 109(63.7) | 9(45.0) | 225(70.3) | | |
| **With sanitizer** | 0(0.0) | 1(0.6) | 0(0.0) | 1(0.3) | | |
| **Total** | 129(100.0) | 171(100.0) | 20(100.0) | 320(100.0) | | |

Across all critical points assessed, hand washing with soap and water was the most commonly reported practice, with adherence increasing alongside higher maternal food safety knowledge. Notably, proper hand hygiene remains one of the least expensive and most effective measures for preventing foodborne and infectious disease transmission [2].

**Conclusion and recommendation:** Mothers with higher food safety knowledge were more likely to practice recommended food safety behaviours. Therefore, enhancing maternal food safety knowledge may serve as a cost-effective, high-impact strategy to strengthen food safety practices.

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**Theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

# NUTRITIONAL STATUS OF PREGNANT WOMEN UTILIZING TRADITIONAL BIRTH ATTENDANTS (TBAs) AND ASSOCIATED FACTORS IN OGUN STATE, NIGERIA

*Ogunsanya, H.A.[1] Bankole S.A.[1], and Olowolafe, T.A.[1]

[1]Department of Public Health, Lead City University, Ibadan, Nigeria

**Corresponding author, e-mail:olumibosede2003@gmail.com , +2348032098585*

**Keywords:** Traditional birth attendants; Nutritional status; Dietary intake; Pregnant women

**Highlights**

- Only 14.8% of pregnant women utilizing TBAs had good nutritional status
- Obese/overweight women had significantly higher odds of poor status
- About 76.7% of pregnant women using TBAs had poor nutritional knowledge

**BACKGROUND AND OBJECTIVES:**

In Ogun State, Nigeria, a significant number of pregnant women utilize the services of Traditional Birth Attendants (TBAs) for their prenatal care and delivery. The nutritional status of pregnant women is a critical determinant of both maternal and fetal health outcomes. The study investigates the nutritional status of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State.

**MATERIALS AND METHOD:**

A cross-sectional, mixed-methods study was conducted in four purposively selected LGAs in Ogun State with high TBA utilization. Two wards were purposively selected per LGA, three practicing TBAs per ward, and 18 pregnant women randomly selected per TBA, giving 425 women (15-49 years); 14 TBAs joined focus group discussions (FGDs). Sample size was derived using Fisher's formula (Z=1.96, p=50%, d=5%). A structured questionnaire captured socio-demographic, socio-economic and dietary data; nutrition knowledge used a 27-item tool (good ≥60% correct). Intake of energy, protein, fat, calcium, iron, zinc, folate, vitamin B12 and vitamin D was obtained via 24-hour recalls, analysed with Food Processor® (ESHA Research) against Dietary Reference Intakes. Anthropometry (weight, height, BMI, MUAC) used standard procedures. Data were analysed using descriptive statistics, Chi-square test, multiple regression and thematic analysis (FGDs). Ethical approval (LCU-REC/24/205) and informed consent were obtained.

**RESULTS AND DISCUSSION:**

Mean age was 27.13 ± 5.89 years; 58.6% were aged 20-29 years, 66.4% were married, and 74.8% earned below minimum wage. Dietary intake fell short of DRI for most nutrients (Table 1); iron (65.6%), vitamin B12 (71.5%) and energy (54.4%) were most affected, while folate was adequate for all. Only 14.8% (63/425) had good nutritional status. BMI was significantly associated with status: obese women had 12-fold higher odds of poor status (OR=12.00, p=0.024) and overweight women six-fold higher odds (OR=5.92, p=0.035) than normal-BMI women, linked to excess adiposity in pregnancy [1]. Only 23.3% had good nutrition knowledge, associated with maternal/spousal education, occupation and food-taboo history. Most TBAs (92.9%) had good nutrition knowledge and counselled women to eat well, but food taboos and economic constraints limited uptake [2]. TBA knowledge therefore does not readily translate into better maternal nutrition.

**Table 1: Dietary intake of pregnant women utilizing TBAs relative to Dietary Reference Intake, Ogun State (n=425)**

| Nutrient | DRI (Pregnant Women) | Within DRI n (%) | Not within DRI n (%) |
|---|---|---|---|
| Energy (Kcal/day) | 2000-2500 | 194 (45.6) | 231 (54.4) |
| Protein (g/day) | 60-110 | 313 (73.6) | 112 (26.4) |
| Fats (g/day) | 67-91 | 176 (41.4) | 249 (58.6) |
| Calcium (mg/day) | 1200-2000 | 278 (65.4) | 147 (34.6) |
| Iron (mg/day) | 27 | 146 (34.4) | 279 (65.6) |
| Vitamin B12 (µg/day) | 2.4-2.8 | 121 (28.5) | 304 (71.5) |
| Zinc (µg/day) | 11-12 | 146 (34.4) | 279 (65.6) |
| Folate (µg/day) | 400+ | 425 (100) | 0 (0) |
| Vitamin D (µg/day) | 10-20 | 301 (70.8) | 124 (29.2) |

## CONCLUSION AND RECOMMENDATION(S):

Pregnant women utilizing TBAs in Ogun State have poor dietary intake and nutritional status, linked to socio-demographic and economic disadvantage. Although TBAs have good nutrition knowledge, cultural and economic barriers limit its translation into better maternal nutrition. Regular nutrition-counselling training for TBAs, stronger referral links with health facilities, and affordable nutrition education for pregnant women are recommended to improve outcomes in TBA-served communities.

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**Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages**

Title: **Multisectoral Nutrition Actions Impact on Anthropometric Outcomes among Under-five Children in Oyo State**

**Authors:**

Alarape, A. O.[1], Babalola, O.[2], Ajetunmobi, O. A.[2], Ayinde, A. K.[2], Olatunji, M. B.[1], Ariyo, O.[3], Ayanleke, J. A.[4], Ezeogu, A.[5], Oyedokun, O.[5], Gyado, R. T.[6] & Oladeji, O.[1]

**Affiliations:**

[1] Oyo State Primary Health Care Board, Ibadan, Nigeria
[2] Oyo State Ministry of Health, Ibadan, Nigeria
[3] Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Nigeria
[4] Oyo State Ministry of Budget and Economic Planning, Ibadan, Nigeria
[5] United Nations Children's Fund (UNICEF), Lagos Office, Nigeria
[6] The World Bank, Nigeria

Corresponding author: Alarape, A. O. | E-mail: khadijah1428@yahoo.co.uk |

Tel: +234 803 475 4502

Keywords: Theory of Change; Stunting; Wasting; Programme implementation

**Highlights**

- Oyo State's multisectoral nutrition response cut wasting below its 2029 target
- Vitamin A, minimum acceptable diet and meal frequency are on track to 2029
- Stunting rose to 26.8%; deworming and breastfeeding remain off track

**Abstract**

**Background and Objectives**: Child malnutrition remains a leading driver of under-five morbidity, mortality, impaired cognition and lost productivity in Nigeria. Over the past eight years, Oyo State has pursued a Theory of Change (ToC)-based multisectoral response, anchored on the State's Multi-Sectoral Plan of Action for Food and Nutrition (OYSMPFAN) [1] and complementary interventions. Tracking progress is essential to inform policy refinement and future investment in child nutrition. This study therefore matched nutrition investments and activities in Oyo State between 2018 and 2026 against child nutrition trends from the demographic and health surveys.

**MATERIALS AND METHODS:** A ToC approach, complemented by documentary review and secondary data analysis, was used to explain how Oyo State's multisectoral response translates planned investments into improved child nutrition. The ToC (Figure 1) followed the standard results chain from inputs to impact, anchored on a stated goal and cross-cutting assumptions, and derived from OYSMPFAN [1] and State programme records, with activities grouped into nutrition-specific, nutrition-sensitive, and enabling/governance streams. Indicators from NDHS 2018 and 2024 and the Mini-DHS 2026 were benchmarked against OYSMPFAN 2029 targets.

**Results and Discussion**: Progress across 10 indicators (2018–2026), benchmarked against OYSMPFAN 2029 targets, is presented in Table 1. Stunting declined from 34.5% (2018) [2] to 23.1% (2024) [3], but rose to 26.8%

(2026) [4], 11.8 points above the 15% target (off track). Wasting rose from 3.9% to 14.4% before falling to 6.3%, below the 7% target (achieved). Underweight rose from 18.0% to 26.1% and fell to 17.7%, a net improvement. Feeding indicators were mixed. Minimum acceptable diet improved from 5.8% to 12.9% and minimum meal frequency from 11.4% to 39.4% (both on track). In contrast, early initiation of breastfeeding fell from 70.6% to 40.8%, minimum dietary diversity from 40.1% to 23.7%, and exclusive breastfeeding reached only 52.1% against an 80% target (all off track). Vitamin A supplementation rose from 39.1% to 69.4% (on track), while deworming stagnated at 9.4% (off track).

**Conclusion and Recommendations:** Oyo State's multisectoral nutrition response has yielded gains against acute malnutrition and underweight, with wasting already meeting its 2029 benchmark and some indicators on track. However, rebounding stunting alongside declining breastfeeding and dietary diversity and stagnant deworming coverage shows that chronic malnutrition requires intensified first 1,000 days action. Priorities are closing the deworming and breastfeeding gaps, sustaining financing, strengthening data systems and institutionalising annual nutrition reviews.

<table>
<tr><td colspan="5">GOAL: Attain optimal nutritional status for all Oyo State residents, prioritsing vulnerable groups – U-5 children, Adolescents, Women of Reproductive Age, the Elderly and People living with Disability</td></tr>
<tr><td>INPUTS & FOUNDATIONS</td><td>ACTIVITIES (Planned Interventions)</td><td>OUTPUTS (Services delivered)</td><td>OUTCOMES (Changes produced)</td><td>IMPACT (Intended change)</td></tr>
<tr><td rowspan="2">*OYSMPFAN 2025-2029 & SBC for Nutrition<br>*Political commitment & Leadership<br>*Ring-fenced domestic financing, counterpart funding & nutrition budget tagging (N500m counterpart 2025; ANRiN N250m; BHCPF N100m)<br>*Functional SCFN, LGCFN & WCFN,<br>*Strengthened nutrition department/units in MDAS<br>*Improved collaboration with Academia, CSOs</td><td>Nutrition-Specific</td><td rowspan="2">*Increased coverage of VAS, deworming, GM&P<br>*More caregivers reached with MIYCN counselling<br>*Increased nutrition-sensitive ANC in PHCs (260)<br>*770 Health workers trained<br>*Increased coverage in SAM cases screened, referred & treated<br>*Locally produced supplementary foods available</td><td>Short-term Outcomes</td><td></td></tr>
<tr><td>*Capacity building of health workers<br>*MIYCN activities monitoring (cots) Improved MIYCN counselling.<br>*Strengthened MNCHW<br>*Strengthened IMAM training & activities<br>*Strengthened Growth Monitoring & Promotion (GMP) & Screening<br>*Prevention & Management of micronutrient deficiency & NCDs: Vitamin A supplementation, deworming, MMS, MNPs, SQLNS<br>*Resuscitation of local supplementary food production (blended soy-flour foods)<br>*Strengthened food demonstration in selected PHCs<br>*Maternal nutrition & ANC</td><td>*Improved caregiver knowledge & attitude<br>*Increased demand & uptake of nutrition services<br>*Better SAM detection & tmanagement<br>*Early initiation & exclusive breastfeeding practiced<br>*Improved complementary feeding & dietary diversity</td><td>Reduced stunting, wasting, underweight, micronutrient deficiency & obesity<br>Improved child survival, growth & cognitive development<br>Enhanced human capital, productivity & socio-economic development</td></tr>
</table>

| | | | | |
|---|---|---|---|---|
| & professional bodies Development partners support (*UNICEF, World Bank/ANRiN, WHO, Evidence Action*)<br>*Nutrition Officers deployed across 33 LGAs<br>*Nutrition depts in MDAs<br>*Strengthened community structures & delivery platforms | **Nutrition-Sensitive**<br>*Agriculture & food production investment<br>*Post-harvest handling & food safety activities<br>*100 schools piloted for gardening<br>*WASH<br>*School health & feeding activities<br>*Nutrition-sensitive social protection & cash transfers<br>*Nutrition radio programmes<br>**Enabling & Governance**<br>*Multisectoral coordination through SCFN<br>*Capacity building<br>*SBCC & advocacy<br>*Resource mobilization & budget tagging<br>*Research, monitoring, evaluation & surveillance | *More HHs reached with WASH, food security & social protection services<br>*Functional coordination & data systems at States/LGAs | **Intermediate**<br>*Improved maternal & child dietary intake<br>*Improved IMAM<br>*Increased access to WASH<br>*Institutionalized multisectoral governance & financing | |
| ***Assumptions & Enablers: Sustained political will & timely fund release * Partners/academia/ alignment & harmonized delivery * Security & safety * Community ownership *No major economic, climate or disease shock*** | | | | |

Figure 1: Oyo State Multisectoral Nutrition Response Theory of Change

**Table 1:** ***Oyo State Food and Nutrition Key Targets by 2029 and Progress as at 2026***

| Indicator | 2018 NDHS | 2024 NDHS | Mini-DHS 2026 | Target 2029 | Status vs. 2029 target |
|---|---|---|---|---|---|
| Increase Early Initiation of Breastfeeding | 70.6 | 40.8 | *47.3 | 60.0 | On track |
| Increase exclusive breastfeeding rate | 52.1 | *34.2 | | 80.0 | Off track |
| Increase the percentage of children ages six months and above who receive Minimum Acceptable diet (MAD) | 5.8 | 12.9 | | 15.0 | On track |
| Improve Minimum dietary diversity | 40.1 | 23.7 | | 40.0 | Off track |
| Increase minimum meal frequency (MMF) | 11.4 | 39.4 | | 50.0 | On track |
| Reduce Stunting Rate among under-five children | 34.5 | 23.1 | 26.8 | 15.0 | Off track |
| Reduce childhood wasting including severe acute malnutrition (SAM) | 3.9 | 14.4 | 6.3 | 7.0* | Achieved |
| Reduce childhood underweight | 18.0 | 26.1 | 17.7 | | Progressing |
| Increase coverage of Vitamin A supplementation 6–59 months | 39.1 | 69.4 | | 85.0 | On track |

| | | | | |
|---|---|---|---|---|
| Increase the % of children who receive deworming tablets | 9.4 | 9.4 | 70.0 | Off track |

*Note*. NDHS = Nigeria Demographic and Health Survey; Mini-DHS = Mini-Demographic and Health Survey; MAD = Minimum Acceptable Diet; MMF = minimum meal frequency; SAM = severe acute malnutrition. Values are percentages. Asterisks are retained from the submitted table.

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**Theme:** Delivering Better Nutrition for all: Connecting the Dots across Life cycle, Systems & Sectors

**Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Effect of Childhood Stunting on Serum C-Reactive Protein Concentration among Under-5 Children

**Name of Author (s):** *Olukogbe, O.O.[1], Afolami, J.I.[1]

**Affiliation of Author (s):**

[1] Department of Human Nutrition and Dietetics, University of Ibadan, Nigeria

***Corresponding author:** Olukogbe, O.O., e-mail: olukogbegbemisola@gmail.com, +2349067432826

**Keywords:** Stunting, C-reactive protein, Growth Disorders, Inflammation, and Infection.

**Highlights**

9. In malnutrition, systemic inflammation is more common in areas with limited resources.
10. Maternal stunting is positively associated with a range of poor outcomes for the development of infants.
11. The family's inability to provide healthy food and living conditions at home is due to their poor economic status.

**Background and Objectives:** Stunting is a chronic form of malnutrition affecting over 149 million children globally [1]. It involves a complex interplay of factors, including inadequate nutrient intake, frequent infections, and other environmental factors [2]. The effect of stunting on the inflammatory biomarker C-Reactive Protein (CRP) remains unclear, given the contrasting reports in the literature. A systematic literature review was conducted to assess serum CRP in stunted and non-stunted children.

**Materials and Methods:** Articles published between the years 1994 and 2024 on childhood stunting and CRP were searched in PubMed, Google Scholar, Scopus and Embase, using search terms. Randomised Controlled Trials (RCTs) and observational studies published on apparently healthy children with no reported clinical conditions were evaluated. Study screening, selection, and data extraction were conducted by two independent reviewers using the PRISMA guidelines for systematic reviews, and data were analysed using thematic analysis to identify recurring patterns. NVivo was used to facilitate systematic coding, theme development, and data management.

**Results and Discussion:** Eighteen studies (7 cross-sectional, 6 case-control, 3 cohort, 2 RCTs; n=4,393) met inclusion criteria, yielding four themes: food insecurity, recurrent infection, socio-economic status, and maternal nutrition variation. Over 70% reported a positive CRP–stunting association, several with $p<0.001$. Elevated CRP (>5–10 mg/L) was accompanied by stunting, wasting, and an underweight prevalence of 38%, 17%, and 27.5%, respectively, with pneumonia (44%) and diarrhoea (36%) as the most common comorbid infections. Socio-economic associations were inconsistent, ranging from significant ($p=0.006$) to negligible ($p=0.556$). Results support a bidirectional malnutrition–infection cycle, reinforcing CRP as a biomarker for early detection of growth faltering in resource-limited settings.

**Conclusion and Recommendations:** This review provides preliminary evidence that elevated CRP is associated with malnutrition (wasting and stunting). Poor nutrition, repeated infections and inflammation are interrelated factors that lead to stunting and growth retardation in children, particularly in developing countries. The results highlighted the importance of the first 1,000 days, from conception to two years of age. Health

interventions should be conducted with other nutrition education programs to ensure adequate nutrition and hygiene.

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**Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Safety of diet supplemented with *Pentadiplandra brazzeana* root on the liver and kidneys of postpartum lactating rats

**Name of Authors:** *Egbule, M. N., Onyeyiriuche, C. C., Okeke, J. C., Shokunbi, O. S.

**Affiliation of Authors:** [1]Department of Biochemistry, Babcock University, Ogun State, Nigeria.

***Corresponding author**: egbulem@babcock.edu.ng, +234-803-372-9604

**Keywords:** Diet safety, Lactation, *Pentadiplandra brazzeana* root, Postpartum

**Highlights: -** *P. brazzeana* root-supplemented diet is safe to liver of lactating postpartum dams.

12. *P. brazzeana* root-supplemented diet is safe to kidneys of lactating postpartum dams.

**Background and Objectives:** Postpartum women in sub-Saharan Africa (SSA) have traditionally used medicinal plants and spices in daily cuisines to promote lactation [1]. Plant lactagogues are in high demand due to postpartum mothers' low breast milk production, although there are limited safety studies [2]. *Pentadiplandra brazzeana* Baill root, an underutilized dietary plant used historically to boost postpartum recovery and breastfeeding outcome in the SSA, has few safety empirical evidence. Neither the plant nor its use as a food additive in the EU or US has obtained the GRAS (Generally Recognized as Safe) FDA/EFSA classification [3]. *P. brazzeana* root was fed to postpartum nursing Wistar rats to assess its liver and kidney safety.

**Materials and Methods:** Thirty, adult, female, albino Wistar rats were randomly distributed into six groups (n = 5): non-pregnant rats (Normal diet- ND; to serve as reference state) fed with basal diet (0 g supplement/Kg feed); lactating rats fed with; basal diet (Control diet- CD), positive control diet (100 g *Trigonella foenum-graecum* supplement/Kg feed), Test Diet (TD) I (50 g *P. brazzeana* supplement/Kg feed), TD II (100 g *P. brazzeana* supplement/Kg feed and TD III (200 g *P. brazzeana* supplement/Kg feed). After 21 days of postpartum supplementation, blood samples were collected from the rats via cervical dislocation. The effects of *P. brazzeana* root-supplemented diet (PBRSD) on plasma aspartate aminotransferase (AST), alanine aminotransferase (ALT), and alkaline phosphatase (ALP) activities; urea, creatinine and uric acid levels were measured using spectrophotometric methods. Data were analysed using descriptive and inferential statistics at $p < 0.05$.

**Results and Discussion:** Tables 1a and 1b reveals liver and kidney function parameters from PBRSD at 50, 100, and 200 g/Kg. Regarding medicinal plant use, hepatotoxicity risk, and glomerulus damage [4], lactating rats fed PBRSD showed a concentration-dependent decrease in plasma AST, ALT, ALP activities and urea, creatinine, uric acid levels. This suggests that *P. brazzeana* root-supplemented diets were safe for the postpartum lactating rats.

**Table 1a: Effect of *P. brazzeana* Baill root-supplemented diet on plasma liver parameters in lactating Wistar rats after 21 days postpartum dietary intervention**

| Parameter | ND | CD | PCD | TDI | TDII | TDIII |
|---|---|---|---|---|---|---|
| **AST(U/L)** | $205.20 \pm 0.58^{c}$ | $248.80 \pm 1.20^{e}$ | $228.60 \pm 0.51^{d}$ | $268.20 \pm 1.11^{f}$ | $187.60 \pm 0.51^{b}$ | $151.80 \pm 0.97^{a}$ |
| **ALT(U/L)** | $100.20 \pm 0.66^{a}$ | $141.60 \pm 0.81^{e}$ | $132.60 \pm 0.87^{d}$ | $131.00 \pm 0.63^{d}$ | $126.60 \pm 1.17^{c}$ | $119.00 \pm 0.45^{b}$ |
| **ALP(U/L)** | $550.00 \pm 3.22^{a}$ | $1021.20 \pm 1.02^{f}$ | $917.60 \pm 0.75^{c}$ | $1001.60 \pm 1.40^{e}$ | $963.20 \pm 1.07^{d}$ | $805.00 \pm 0.55^{b}$ |

**Table 1b: Effect of *P. brazzeana* Baill root-supplemented diet on plasma kidney parameters in lactating Wistar rats after 21 days postpartum dietary intervention**

| Parameter (mmol/L) | ND | CD | PCD | TDI | TDII | TDIII |
|---|---|---|---|---|---|---|
| **Urea** | $6.48 \pm 0.04^{e}$ | $5.76 \pm 0.09^{d}$ | $4.68 \pm 0.06^{c}$ | $3.38 \pm 0.06^{b}$ | $3.06 \pm 0.04^{a}$ | $3.14 \pm 0.05^{a}$ |
| **Creatinine** | $85.60 \pm 2.21^{c}$ | $76.40 \pm 3.88^{b}$ | $72.20 \pm 1.74^{a, b}$ | $69.80 \pm 3.12^{a, b}$ | $70.00 \pm 3.13^{a, b}$ | $64.00 \pm 1.23^{a}$ |
| **Uric acid** | $377.00 \pm 2.43^{a}$ | $561.80 \pm 1.07^{f}$ | $547.80 \pm 2.29^{e}$ | $538.80 \pm 0.80^{d}$ | $513.40 \pm 0.51^{c}$ | $410.80 \pm 0.86^{b}$ |

ND: Normal diet; CD: control diet; PCD: positive control diet; TDI: test diet I; TDII: test diet II; TDIII: test diet III

**Conclusion and Recommendation:** In conclusion, *P. brazzeana* root-supplemented diet exhibited safety at 50, 100 and 200 g/kg diet on the liver and kidneys of postpartum lactating rats. However, further studies should be done on its products using other animal or human population models to ascertain its safety evaluation at dietary intake levels for improved public health awareness.

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**Sub-themes:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Intervention Across Life Stages

**Title:** Nutritional Status and Food Poverty of Under-Five Children (6-23months) in Abeokuta South Local Government Area, Ogun State Nigeria.

**Name of Authors:** *Adepoju, A. B., Idowu, O. E., Akinbule, O.O., Abdussalaam, O. O. and Ose, I. F.

**Affiliation of the authors:** Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

**adepojuab@funaab.edu.ng* , *07037506965*

**Keywords:** Malnutrition, Under-five children, Child food poverty

**Highlight:** **(**1) Majority of the under-five children had normal nutritional status

(2) Child Food Poverty was significantly negatively correlated with the MUAC of the children

## BACKGROUND AND OBJECTIVE

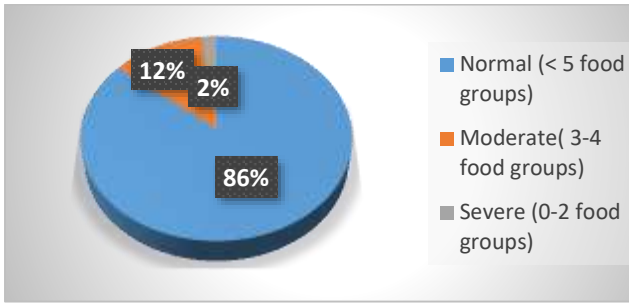
Malnutrition remains a major public health challenge globally and one of the major threats to the health status of under-five children, particularly in developing countries [1,2]. Nigeria bears a disproportionate burden, ranking among the ten countries with the highest prevalence of child malnutrition [3] the second-highest prevalence of stunting globally, and child wasting prevalence above the global average [4]. This problem is driven by so many factors like inadequate food intake, poor diet quality, and child food poverty, which refers to the inability of children to access and consume a diverse and nutritious diet during early childhood [5]. Continuous assessment of these factors will help in providing necessary intervention to reduce malnutrition. Therefore, this study assessed the nutritional status and child food poverty among under-five children in selected communities in Abeokuta South Local Government Area, Ogun State.

## MATERIALS AND METHODS

Descriptive cross-sectional research design was adopted and a total number of two hundred (200) mother child-pairs was selected using multistage sampling technique. Sociodemographic and economic characteristics including the sex of the children and infant and young child feeding practices data were obtained using a semi-structured and interviewer administered questionnaire. Anthropometry measurement (weight, length and MUAC) of the under five children was taken using standard procedure and analyzed using WHO Anthro. soft-ware. Child food poverty was assessed using minimum dietary diversity score and was categorized based on the number of food group consumed (UNICEF, 2024). Data were analyzed using SPSS. version 27.0

## RESULTS AND DISCUSSION

Most of the mothers were married (96.0%), Yoruba (86.0%), had secondary education (58.5%), engaged in personal businesses (65.5%), and earned ₦71,000–₦100,000 monthly (38.5%). Also, 97.5% of them initiated breastfeeding at birth (97.5%), while 55% practiced exclusive breastfeeding. Nearly all the children had normal nutritional status based on weight-for-age (92.5%), height-for-age (90%), weight-for-height (92.5%), and MUAC-for-age (95.5%), although some had moderate/severe underweight (6.5%/1%), stunting (9%/1%), wasting (7.5%), and acute malnutrition (3%/1.5%).



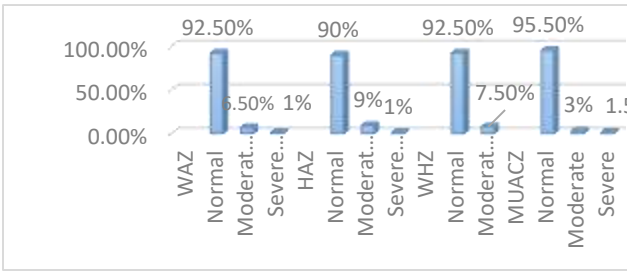



***Figure 1: Percentage distribution of child food poverty figure 2: Nutritional status of the respondents***

Child food poverty was moderate among 12% of children and severe among 2%, while 86% were not experiencing child food poverty. A significant negative correlation was observed between child food poverty and MUAC ($r = -0.142$, $p = 0.04$). Child food poverty was significantly associated with maternal ethnicity, family background, educational level, and occupation ($p < 0.05$).

## CONCLUSION AND RECOMMENDATION

Although most children had normal nutritional status, moderate and severe malnutrition and child food poverty were still observed. Child food poverty was associated with poorer nutrition outcomes, highlighting the need to promote dietary diversity among under-five children.

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**SUB THEME 2: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

Title: **Assessment of Systemic Barriers and Enablers to Vitamin A Supplementation and Deworming in Nigeria's Maternal, Newborn and Child Health Week**

**Name of Authors:** Ariyo, O.[1], Kutondo, E.[2], Adedayo, A.[3], Hajeebhoy, N.[2], Durojaye, A.[3], Olorundare, O.K.[3], Ojo, T.J.[1*], Hassanu, H.[3], David, A.[3], Muhammad, L.[3], Dakurah, P.[2], Shapu, Y.C.,[2] and Sam O.[4]

**Affiliation of Authors:** [1]Department of Human Nutrition & Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan;

[2]United Nations Children's Fund (UNICEF), Nigeria Country Office, Abuja;

[3]Hanovia Limited, Abuja;

[4]National Primary Health Care Development Agency (NPHCDA), Abuja

***Corresponding Author Email & phone No.:** tomilolaojo08@gmail.com; +234 806 245 319

**Keywords:** Vitamin A supplementation, Deworming, Coverage, Equity, Health systems, MNCHW

**Highlights**

1. Verified vitamin A supplementation coverage (71.1%) met the national 65% target but diverged sharply from administrative reports (~87%), exposing systemic over-estimation in routine data.
2. Coverage gaps were driven by preventable health-system barriers, delayed funding, commodity stock-outs, health-worker absenteeism and poor caregiver knowledge, that timely financing, partnerships and community engagement can overcome.

**BACKGROUND AND OBJECTIVES:** Vitamin A deficiency (VAD) remains a public health problem in Nigeria, where about one in three children aged 6–59 months is affected and VAD contributes to preventable childhood morbidity and mortality. The bi-annual Maternal, Newborn and Child Health Week (MNCHW), held in May/June and November/December, is the primary platform for delivering high-dose vitamin A supplementation (VAS) and deworming to this age group. However, national coverage is largely drawn from administrative tallies that are suspected to be inaccurate and to mask sharp subnational inequities. This study validated the reported coverage of the November–December 2024 MNCHW through a representative post-event coverage survey (PECS) and investigated the systemic barriers and enablers shaping the delivery and uptake of VAS and deworming.

**MATERIALS AND METHODS:** A cross-sectional, mixed-methods PECS was conducted across six purposively selected states representing Nigeria's geopolitical zones (Bayelsa, Enugu, Gombe, Katsina, Lagos and Niger). A two-stage cluster design selected 462 enumeration areas by probability proportional to size (77 per state) and 14 households per area, yielding 6,468 caregivers of children aged 6–59 months. Quantitative data were collected by computer-assisted personal interviewing (SurveyCTO) on socio-demographics, VAS and deworming uptake, and caregiver knowledge, scored on a 20-point scale as good (≥15), fair (8–14) or poor (<8). Coverage was estimated with 95% confidence intervals in Stata 17.0 and validated against administrative reports. Fifteen key-informant interviews with national and state stakeholders, including the Directors of Nutrition at the FMoHSW and NPHCDA and desk officers at UNICEF, Nutrition International, Helen Keller International and Vitamin Angels, were thematically

analysed using the WHO Health Systems Building Blocks framework. Analysis of de-identified data followed ethical approval.

**RESULTS AND DISCUSSION:** Verified VAS coverage was 71.1%, meeting the 65% national target set in the National Multisectoral Plan of Action on Food and Nutrition but falling short of the 90% aspiration, with wide state disparities from 49.2% in Katsina to 84.0% in Enugu (Table 1). Deworming coverage was lower at 52.7%. A marked dissonance emerged between verified coverage and administrative reports (~87%), pointing to systemic over-estimation in routine data. Caregiver knowledge was predominantly poor (67%), and the leading reasons for non-uptake were lack of awareness (36.5%) and health-worker absenteeism (31.2%). Qualitative analysis identified delayed release of funds, frequent deworming-tablet stock-outs, a weak health system, socio-cultural resistance and insecurity in hard-to-reach areas as the principal barriers, while strong partner support, house-to-house delivery and community engagement were the main enablers. These findings echo evidence that maternal awareness, education and urban residence raise the likelihood of VAS uptake, and that poor knowledge of vitamin A benefits depresses demand,[1] while the identified barriers align with a systematic review of VAS implementation across Africa in which capsule stock-outs, weak health-worker capacity and poor monitoring recur as dominant constraints.[2] The gap between administrative and survey coverage reinforces the indispensability of periodic PECS for accountability.

**Table 1: Verified VAS and deworming coverage by state, November–December 2024 MNCHW (PECS, N = 6,468)**

| Indicator (%) | Bayelsa | Enugu | Gombe | Katsina | Lagos | Niger | Total |
|---|---|---|---|---|---|---|---|
| **VAS coverage** | 74.1 | 84.0 | 68.7 | 49.2 | 75.2 | 79.3 | 71.1 |
| **Deworming coverage** | 63.4 | 58.3 | 43.4 | 39.7 | 50.3 | 64.1 | 52.7 |

*VAS national target = 65% (National Multisectoral Plan of Action on Food and Nutrition). Administrative report across assessed states ≈ 87%.*

**Table 2: Barriers and enablers mapped to the WHO Health Systems Building Blocks**

| Building block | Barriers | Enablers |
|---|---|---|
| Financing | Delayed release of funds; donor-dependence; reduced campaign efficiency. | Timely fund release; sustained partner support. |
| Commodities & supply | Frequent deworming-tablet stock-outs. | Donor-secured capsule supply; house-to-house delivery. |
| Service delivery | Postponed campaigns; health-worker absenteeism; insecure/hard-to-reach areas. | Integrated MNCHW delivery; trained personnel; community engagement. |

| Building block | Barriers | Enablers |
|---|---|---|
| Information (M&E) | Administrative over-estimation (~87% vs 71.1% verified); weak reporting. | Periodic PECS validation; strengthened routine data systems. |
| Demand / community | Poor caregiver knowledge (67%); low awareness (36.5%); socio-cultural resistance. | Community mobilisation; caregiver sensitisation. |

**CONCLUSION AND RECOMMENDATION(S):** While the MNCHW platform has achieved moderate VAS coverage that meets the national 65% target, significant gaps persist due to systemic and equity-related barriers, and reliance on donor-driven campaigns is unsustainable. Northern states such as Niger show that strong partnerships and government commitment can offset these constraints. To achieve universal coverage, Nigeria must address funding delays, commodity security, administrative data gaps and knowledge gaps through decentralised and timely financing, integrated service delivery, strengthened data systems validated by periodic PECS, and sustained community mobilisation.

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**Sub-Theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages

# MIYCN GUIDELINE TRAINING OF THE FINAL-YEAR NUTRITION RELATED STUDENTS IN IBADAN

Folasire, O.F. [1,2,] and [*]Lamidi, A.A.[1]

[1]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Nigeria

[2]Family Medicine Department, University College Hospital, Ibadan, Nigeria

[*]Corresponding author: aishalamidi9@gmail.com, +2348089480850

**Keywords:** MIYCN; nutrition students; training intervention; pre-service education

## Highlights

- MIYCN training had final year Nutrition-based students as respondents
- The training increased MIYCN knowledge significantly within preservice setting

## Background and Objectives

Preparing nutrition students to communicate the recommended MIYCN guidelines is essential to mitigating the prevalence of child malnutrition in Nigeria. This study assessed the effect of MIYCN guideline training on the knowledge of final-year nutrition-related students in Ibadan, Nigeria.

## Methods

A pre-post cross sectional study design was implemented to carry out this study among 93 nutrition-based final year students in selected tertiary institutions in Ibadan. A semi-structured self-administered questionnaire was used to collect data on socio-demographic characteristics, and MIYCN Domain knowledge with a video demonstration from EEBF tool, at baseline and immediately after the training. The data was analysed using mean, McNemar's test and a paired t-test with significance at $p < 0.05$. Adequate knowledge was defined as ≥75% of the maximum obtainable score of 55.

## Results and Discussion

**Table 1. Pre- and post-intervention MIYCN knowledge outcomes (n = 68)**

| **Outcome** | Pre-training Adequate Knowledge n (%) | Post-training Adequate Knowledge n (%) | Change(% points) | Test | p-value |
|---|---|---|---|---|---|
| **Knowledge score, mean ± SD (maximum 55)** | 38.4 ± 5.6 | 45.9 ± 4.4 | +7.5 (C.1 5.84 to 9.19) | $X^2$, t = 8.94 | < 0.001 |
| **Adequate knowledge, n (%)** | 22 (32.4%) | 61 (89.7%) | +57.3 (C.I. 43.2% to 67.9%) | McNemar's $X^2 = 35.22$ | < 0.001 |
| **Knowledge Domains Tested:** | | | | | |
| **Maternal Nutrition (Pregnant women)** | 24 (35.3%) | 63 (92.6%) | +2.5 (C.I. 2.02 to 2.92) | t = 10.97 | < 0.001 |

| | | | | | |
|---|---|---|---|---|---|
| **Maternal Nutrition (Lactating woman)** | 39 (57.4%) | 66 (97.1) | +2.1 (C.I. 1.66 to 2.60) | t = 9.10 | < 0.001 |
| **Early initiation and sucking reflex** | 44 (64.7%) | 61 (89.7%) | +1.0 ( C.I. 0.56 to 1.50) | t = 4.36 | < 0.001 |
| **Exclusive Breastfeeding** | 31 (45.6%) | 53 (77.9%) | +1.9 (C.I. 1.18 to 2.58) | t = 5.37 | < 0.001 |

A total of 68 respondents had complete paired data for pre- and post-intervention analysis. The mean knowledge score rose from 38.4 ± 5.6 to 45.9 ± 4.4 out of 55 ($\chi^2 = 8.94$ $p < 0.001$). Also, the proportions with adequate knowledge increased from 32.4% to 89.7% after the training (McNemar's $\chi^2 = 35.22$, $p < 0.001$). This represents an absolute increase indicating a large and educationally meaningful short-term improvement. Similar intervention studies in Abakaliki and Ibadan reported improved maternal or caregiver knowledge and feeding practices following nutrition education (1,4), strengthening the plausibility that focused instruction can improve MIYCN competencies in comparable settings. Significant gains across all four content sections, particularly maternal nutrition (pregnant and lactating woman) and exclusive breastfeeding, suggest that the intervention addressed broad MIYCN knowledge gaps rather than improving only one topic. The findings support structured MIYCN instruction in pre-service education, consistent with Nigeria's national MIYCN policy and practical-skills training materials, which emphasize competent counselling on maternal nutrition, early initiation, exclusive breastfeeding and complementary feeding (2,3). They also align with the WHO/UNICEF integrated counselling course, which identifies trained health workers as central to protecting breastfeeding and promoting appropriate complementary feeding (5). However, the single-group pre-post design cannot exclude testing effects, social-desirability bias or other influences unrelated to the training. The modest sample, selection of final-year students from institutions in one city, and immediate post-training assessment also limit generalisability and do not establish long-term retention or translation into counselling practice.

**Conclusion and Recommendation**

The MIYCN guideline training, including structured MIYCN and practical video demonstrations of suckling reflex from EEBF tool, significantly improved students' short-term knowledge and may strengthen their readiness to deliver maternal and infant-feeding counselling. Therefore, it is recommended that:

- Include MIYCN teaching, demonstration and counselling evaluation in pre-service curriculum.
- Deliver refresher training to aid knowledge retention.
- Perform larger controlled studies, with delayed follow-up, and skills assessment in practice.

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**Theme/sub-theme:** MIYCN AS A Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Dietary Diversity Score and Weight-For-Height Status of Preschool Children in Semi-Urban and Rural Communities of Umuahia South Local Government Area, Abia State.

**Name of Authors:** *Nwofia B.K.[1], Okorie I.[2], Agina E.K.[3] and Ekeowa N.J.[1]

**Affiliation of Authors:**

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture Umudike, Nigeria.

[2]Department of Public Health, Cosmopolitan University Abuja, Nigeria.

[3]Department of Hotel Tourism and Management, Michael Okpara University of Agriculture Umudike.

**Email and phone number of corresponding author:** *Nwofia B.K., nwofia.blessing@mouau.edu.ng, +2349063063087

**Keywords:** Dietary Diversity Score, Weight-For-Age, Preschool Children

**Highlights**

- Diets of the pre-school children were largely reliant on staple foods and low in animal-source foods, eggs, and vitamin A-rich fruits and vegetables.
- Weight-for-height status was significantly influenced by dietary diversity, household size, household income, and mother's education.
- Children with low dietary diversity were more likely to be wasted.

**BACKGROUND AND OBJECTİVES:** Proper nutrition in the preschool years is vital for healthy growth, brain development, and lifelong well-being. The study assessed the dietary diversity score and weight-for-height status of preschool children in semi-urban and rural communities of Umuahia South Local Government Area, Abia State, Nigeria.

**MATERIALS AND METHOD:** A community-based cross-sectional study was conducted among 318 preschool children aged 2–4 years and their caregivers, selected from six randomly chosen communities using a multi-stage sampling technique. Sociodemographic and individual dietary diversity score (IDDS) data were collected using a semi-structured questionnaire. Children's weight and height were measured and analyzed using WHO Anthro software to obtain Z-scores for weight-for-height, weight-for-age, and height-for-age. Descriptive statistics and Chi-square tests were used to analyze the data, with significance set at $p < 0.05$.

**RESULTS AND DISCUSSION:** The mean age of children was 2.86 ± 0.79 years; 52.8% were male. Most households were small (1–5 members; 64.5%) and low-income (< ₦70,000/month; 66.4%). Caregivers mostly had secondary education (62.9%), with trading (34.3%) and civil/public service (33.0%) as predominant occupations. Dietary assessment showed universal consumption of grains, roots, and tubers (100%), while intake of animal-source foods, eggs, and vitamin A-rich fruits and vegetables was low. More than half of the children (52.8%) did not meet minimum dietary diversity (≥4 food groups). Anthropometric measurements revealed stunting (25.5%), underweight (15.7%), wasting (7.9%), and overweight/obesity (3.1%). According to WHO and UNICEF guidelines, consumption of at least four food groups is the

minimum indicator of adequate dietary diversity for young children. The prevalence of MDD in this study is comparable to national estimates reported in the National Demographic and Health Survey, where many children fail to meet recommended dietary diversity standards and only 12.4% of children aged 6 to 23 months fed with minimum dietary diversity(3).

Wasting was significantly associated with low dietary diversity ($p = 0.001$), larger household size ($p = 0.010$), low household income ($p = 0.030$), and lower maternal education ($p = 0.049$). This finding is consistent with previous studies that reported significant association between dietary diversity and wasting ($p = 0.018$). Improved dietary diversity significantly reduced the likelihood of wasting among Nigerian children ($p < 0.01$). This supports WHO recommendations that improved dietary diversity reduces the risk of acute malnutrition(4,5,6).

**Table 1: Minimum Dietary Diversity among Preschool Children**

| Dietary diversity | Frequency (n = 318) | Percentage (%) | Mean ± SD |
|---|---|---|---|
| Low diversity (≤ 3 food groups) | 168 | 52.8 | 3.41 ± 0.16 |
| MDD (≥ 4 food groups) | 150 | 47.2 | |

MDD = Minimum Dietary Diversity

**Table 2: Factors Associated With Weight-For-Height of Preschool Children**

| Wasting Indicator | Factors | | p-value |
|---|---|---|---|
| | DDS (Child) | | |
| | LDD | MDD | 0.001 |
| Wasted | 14 (17.1) | 11 (11.6) | |
| Normal | 68 (82.9) | 84 (88.4) | |
| | Child's Sex | | |
| | Male | Female | 0.050 |
| Wasted | 12(14.0) | 13(14.3) | |
| Normal | 74(86.0) | 78(85.7) | |
| | Household size | | 0.010 |
| | Small | Large | |
| Wasted | 9(8.9) | 16(21.1) | |
| Normal | 92(91.1) | 60(78.9) | |
| | Household income | | 0.030 |
| | Low | High | |
| Wasted | 15(17.6) | 10(10.9) | |
| Normal | 70(82.4) | 82(89.1) | |
| | Mother's Education | | 0.049 |
| | Low | High | |
| Wasted | 14(15.1) | 11(13.1)) | |
| Normal | 79(84 | 73(86.9 | |

**CONCLUSION AND RECOMMENDATİON(S):** Dietary diversity, household size, household income, and maternal education significantly influenced weight-for-height status. Interventions targeting improved dietary diversity and socio-economic support are needed to enhance nutritional outcomes among preschool children.

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**Sub-theme:** MIYCN as a veritable framework for delivering Nutrition-ensitive and Specific intervention across life stages

**Title :** Evaluation Of Infant And Young Child Feeding Practices Among Mothers Attending Immunization Clinics In Abakaliki Urban, Ebonyi State: A Cross-Sectional Study

*Edafioghor L.O. [1] , Ibeanu V. N.[2] , and Ona F. A[3]

[1] Department of Human Nutrition and Dietetics, Federal University of Medical and Health Science, Kwale.
[2] Department of Nutrition and Dietetics, University of Nigeria, Nsukka
[3] Department of Human Nutrition and Dietetics, State University of Medical and Applied Science, Igbo-Eno
**Juliegreat24@yhoo.com.** +2348056032283

**Highlights:**

- 65.4% of mothers practiced exclusive breastfeeding, 50% introduced complementary feeding at 6months and 51.2% reported zero fruit/vegetable intake , Only 31.9% of children received the minimum acceptable diet (MAD)
- The complementary feeding indicators (minimum dietary diversity, minimum meal frequency and dietary diversity) had a significant association (P< 0.05) with some socio demographic characteristics of the respondents.

**Key words:** Breastfeeding, complementary feeding, minimum dietary diversity, minimum acceptable diet

## Background and Objectives

The World Health Organization (WHO) recommends exclusive breastfeeding (EBF) for the first six months of life, followed by continued breastfeeding for up to two years or beyond alongside the timely introduction of safe, nutritionally adequate complementary foods [1]. Despite this guidance, sub-optimal Infant and Young Child Feeding (IYCF) practices remain common in Nigeria and contribute to persistently high rates of child stunting, wasting, and morbidity. This study assessed IYCF practices among mothers attending immunization clinics in Abakaliki urban, Ebonyi State.

## Methods

A cross-sectional design was employed to assess IYCF practices among mothers of children aged 6–24 months attending immunization clinics in Abakaliki urban, Ebonyi State. A sample of 373 respondents was calculated using Cochrane formular. The mothers with their infants (6months – 24months) were randomly selected from 5 immunization clinics/health centers in Abakaliki urban, Ebonyi state. These five clinics/health centers were purposefully selected because of their involvement in maternal and child health services. Data were collected using a structured, interviewer-administered questionnaire covering (a) socio-demographic and socioeconomic characteristics, (b) IYCF practices, and (c) hygiene practices. Data were analyzed in SPSS version 25 using descriptive statistics (frequencies, percentages, means) and adjusted logistic regression to examine associations between socio-demographic characteristics and complementary feeding indicators.

## Results and Discussion

The exclusive breastfeeding rate observed (65.4%) compares favourably with national estimates, suggesting relatively strong breastfeeding promotion within the study area, although continued nutrition education is needed given that about one third of infants still received early supplements such as infant formula and plain water, practices is inconsistent with WHO recommendations [1]. Timely introduction of complementary foods at 6 months was achieved by only half (50.0%) of respondents, this report is in contrast with a similar study done at Enugu [3] that reported lower rate and dietary diversity (37.6%) and minimum acceptable diet (31.9%) remained low, reflecting a heavy reliance on starch-based first foods such as pap with limited inclusion of protein- and micronutrient-dense foods. This pattern is consistent with known drivers of child undernutrition in Nigeria [2]. In adjusted regression models, married women were more likely than single women to meet minimum dietary diversity (AOR 1.25) and minimum adequate diet (AOR 1.85), while unemployed and self-employed mothers had significantly lower odds of meeting dietary diversity and adequate diet thresholds. Tertiary education was strongly associated with meeting minimum meal frequency (AOR 3.24) and minimum adequate diet (AOR 2.81).

## Conclusion and Recommendation

Breastfeeding initiation and exclusive breastfeeding practices in Abakaliki are relatively encouraging, complementary feeding quality particularly dietary diversity and diet adequacy remains sub-optimal. Nutrition education interventions targeting mothers with lower educational attainment and economically disadvantaged households, alongside continued promotion of hygienic feeding practices, are recommended to improve IYCF outcomes in this population.

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**MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

# DETERMINANTS OF EARLY INITIATION OF BREASTFEEDING AMONG LACTATING MOTHERS ATTENDING PRIMARY HEALTH CENTRES IN ODOGBOLU LOCAL GOVERNMENT AREA, OGUN STATE

*Oriola, T.H.[1], [2], Adekiitan, O.O.[1], Wahab, N.O.[1], [2] and Akerele, R.A.[1]

[1]Department of Home Economics and Hotel Management, College of Vocational and Technical Education, Tai Solarin Federal University of Education, Ijagun, Ijebu-Ode, Ogun State, Nigeria.

[2]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo State, Nigeria.

Oriolatemitope52@gmail.com , +2347067613170

Keywords: Early Initiation, Breastfeeding, Lactating Mothers, Primary Health Centre

**Highlights**

- ✓ 70% of eligible mothers initiated breastfeeding within the first hour of childbirth.
- ✓ Identified determinants were maternal education, ANC visits and facility delivery.
- ✓ Occupational status and Household Income had less influence on EIBF.

**BACKGROUND AND OBJECTIVES:**

Early initiation of breastfeeding (EIBF) is a cost-effective intervention that boosts infant immunity, reduces neonatal infections and promotes exclusive breastfeeding. In Nigeria, only 36% of newborns are breastfed within one hour of birth, below the 46% global baseline and the 2030 target. Understanding EIBF determinants is essential for identifying appropriate interventions for improving maternal and neonatal health outcomes. This study examined the determinants of EIBF among lactating mothers attending Primary Health Centres in Odogbolu Local Government Area, Ogun State.

**METHODS:**

This descriptive cross-sectional study employed purposive sampling to select three PHCs and 100 lactating mothers with infants aged 0 to 6 months. Data were collected from the respondents through the use of a semi-structured questionnaire to identify the determinants of early initiation of breastfeeding among lactating mothers who patronize PHCs. The quantitative data were gathered and analysed using the IBM Statistical Package in Social Sciences (SPSS) version 30.

**RESULTS AND DISCUSSION:**

Of the eligible mothers, 80% agreed to the practice of EIBF (70% agreed to initiating breastfeeding within the first hour after birth while 10% strongly agreed). Across the sampled PHCs, the identified factors for early initiation of breastfeeding revealed that maternal level of education, frequent ANC visits, and health facility delivery emerged as the strongest determinants, while occupation and household income were perceived as having comparatively less influence. Determinants of EIBF consistent with this present study [1] found that maternal educational attainment and place of delivery were the strongest predictors of early breastfeeding initiation among mothers in south-western Nigeria, as more educated mothers were more likely to

understand and apply breastfeeding information received during antenatal visits. In contrast, a study by [2] revealed that household income and occupational status were the most significant determinants of early breastfeeding initiation among mothers in northern Nigeria, as economic constraints limited access to health facilities where breastfeeding support was provided.

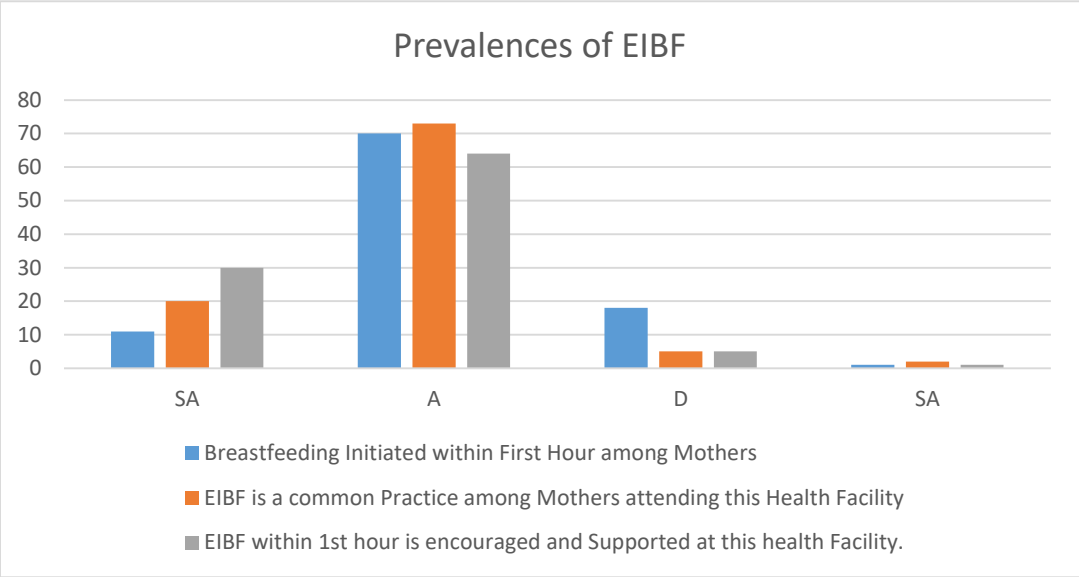



**Figure 1: Prevalence of Early Initiation of Breastfeeding.**

**Table 1: Socio-demographic and socio-economic factors that influence early initiation of breastfeeding (n= 100).**

| Influencers | SA | A | D | SD |
|---|---|---|---|---|
| | F (%) | F (%) | F (%) | F (%) |
| Maternal Level of Education improved understanding of the importance of breastfeeding within the first hour afterbirth | 15 (15) | 75 (75) | 6 (6) | 4 (4) |
| Mothers who deliver their babies at the Health Facility Based Delivery receives EIBF support than those who deliver at home. | 67 (67) | 24 (24) | 8 (8) | 1 (1) |
| Household Income affected my ability to access the health facility services that promote EIBF | 1 (1) | 3 (3) | 77 (77) | 19 (19) |
| Regular ANC Attendance improved knowledge and confidence to initiate breastfeeding within the first hour of birth. | 19 (19) | 62 (62) | 15 (15) | 4 (4) |
| Occupational Demands affect my initiation of Breastfeeding within the recommended first hour after delivery. | 6 (6) | 2 (2) | 24 (24) | 68 (68) |
| Mothers with Higher Levels of Education in my community are more likely to initiate breastfeeding early. | 79 (79) | 14 (14) | 3 (3) | 4 (4) |

## CONCLUSION AND RECOMMENDATION (S):

Sustained health education during antenatal visits promotes early breastfeeding initiation. Strengthening these enabling factors is therefore essential for further improving timely breastfeeding initiation.

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**Theme/sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Nutrition Education and Multiple Micronutrient Supplementation Effect on Maternal and Birth Outcomes in Pregnant Adolescents: A Quasi-Experimental Study in Bauchi State, Nigeria

**Name of Authors**: Ajayi K[1]., Onyekweli-Ugeh C. N[1], Tanimonure A.M[1] and Alebiosu, I. A[1].

[1]Department of Human Nutrition and Dietetics, College of Medicine and Health Sciences Afe Babalola University, Ado-Ekiti Corresponding author email: ajayikayode@abuad.edu.ng

**Keywords:** Adolescent pregnancy; Micronutrient supplementation; Dietary diversity; Birth outcomes; Nutrition intervention

**Highlights:**

- Dramatic gains in diet quality and knowledge
- Improvement in maternal nutritional and haematological status.
- Better birth outcomes, with birth weight the standout

**BACKGROUND AND OBJECTIVES:** Pregnant adolescents are vulnerable to micronutrient deficiencies due to the increased nutritional demands and poor diet quality. Despite the high prevalence of early marriage, adolescent pregnancy, and malnutrition in Bauchi State, targeted community-based nutrition interventions for pregnant adolescents remain scarce. This study assessed the effectiveness of a community-based nutrition intervention on the micronutrient status and diet quality of pregnant adolescents.

**MATERIALS AND METHOD:** The study adopted a quasi-experimental design involving 140 pregnant adolescents (70 control, 70 intervention) aged 10-19 years who attended antenatal care (ANC) at comprehensive Primary Health Care (PHC) in Dambam and Alkaleri Local Government Areas (LGAs), selected through multistage sampling. The intervention combined monthly nutrition education and daily Multiple Micronutrient Supplementation administered over 23 weeks (13th to 36th week), while the control group received routine antenatal care only. Data were collected between April 2025 and January 2026. Diet quality was assessed using the FAO Minimum Dietary Diversity for Women Indicator (adequate ≥5 food groups). Nutrition knowledge was assessed using a 20-item questionnaire on maternal nutrition during pregnancy, categorised as high (16–20), medium (11–15), or low (≤10). Anthropometric measurements included weight and Mid-Upper Arm Circumference (MUAC) (> 23 cm normal nutritional status). Serum Vitamin $B_{12}$ levels, Packed Cell Volume (PCV) and Haemoglobin were analysed using standard laboratory procedures. Food consumption patterns and birth outcome data, including birth weight and length, were also collected. Data were analysed using SPSS v25 and presented using Chi-square tests, independent and paired-samples t-tests, Mann–Whitney U and Wilcoxon signed-rank tests at $p < 0.05$.

**RESULTS AND DISCUSSION:** Of 140 enrolled participants, 117 (58 control and 59 intervention) completed the study and were analysed. At baseline, 68.6% and 74.3% of the control and intervention groups, respectively, had inadequate dietary diversity. Median nutrition knowledge scores were comparable between the control and intervention groups [8 (IQR: 7–10) vs. 8 (IQR: 6–9)]. Following the intervention, a marked improvement in dietary diversity was observed among participants in the intervention group, with almost all participants achieving the minimum dietary diversity threshold. This improvement can be attributed to the nutrition education intervention, which likely increased awareness of the importance of

consuming diverse food groups and encouraged participants to incorporate a wider range of foods into their daily diets. Several studies support the effectiveness of nutrition education in improving dietary diversity among pregnant women and adolescents [1]. Mean serum vitamin $B_{12}$ levels were 538.0 ± 277.7 and 462.1 ± 192.2 pg/mL, while mean PCV values were 35.4 ± 4.9% and 35.5 ± 3.7% in the control and intervention groups ($p > 0.05$). Post-intervention, participants in the intervention group achieved significantly better outcomes ($p < 0.05$) than those in the control group, including normal MUAC status (83.6% vs. 55.2%) and gestational weight gain from 13 to 36 weeks (10.8 ± 2.5 kg vs. 9.6 ± 2.5 kg; within IOM-recommended ranges). Neonates born to mothers in the intervention group had higher birth weights (2.91 ± 0.34 kg vs. 2.30 ± 0.29 kg) and lengths (48.30 ± 1.77 cm vs. 47.58 ± 1.17 cm).

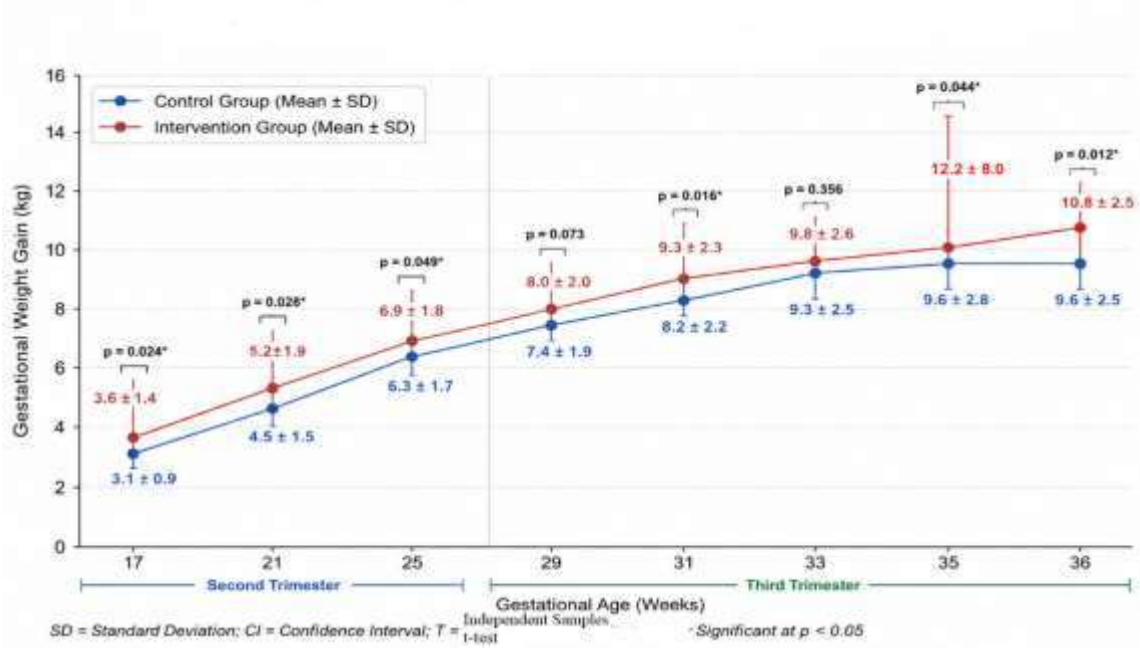



**Figure 1: Comparison of Gestational Weight Gain between Control and Intervention Groups at various Time Points in the Pregnancy**

**CONCLUSION AND RECOMMENDATION(S)**: Integrating nutrition education with routine antenatal supplementation may maximise the effectiveness of multiple micronutrient supplementation in improving maternal nutritional status and pregnancy outcomes in resource-constrained settings. Structured nutrition education should be integrated into routine antenatal care services at primary healthcare facilities, particularly in areas with a high of adolescent pregnancy

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**Sub theme: MIYCN**

**Title: Breastfeeding Knowledge and Practices Among Mothers Attending Public Health Facilities in Umuahia North Local Government Area, Abia State**

*Dike, C. C [1], Adeoye-Agomoh, Q. C.[1] and Ezenwa, H.C.[1]
[1]Department of Human Nutrition and Dietetics, College of Applied Food Sciences and Tourism, Michael Okpara University of Agriculture, Umudike.
*Corresponding author email: chiomachiemela@gmail.com, +2348060059691
Keywords: breastfeeding, breastmilk, practices
Highlights

- Over 60% of mothers had good knowledge of breastfeeding practices.
- Many mothers gave water and bitter kola water in the first 6 months of life.

**BACKGROUND AND OBJECTIVES**: Breastmilk supports optimal infant growth and development. The World Health Organization recommends exclusive breastfeeding for the first 6 months, with no other food or liquid, including water [1]. However, the early introduction of water and other substances has been reported in Nigeria [2]. Local practices, such as giving bitter kola water during early infancy, also require attention. This study assessed breastfeeding knowledge and practices, including the use of water and bitter kola water, among mothers attending public health facilities in Umuahia North Local Government Area, Abia State.

**MATERIALS AND METHODS**: A descriptive cross-sectional study was conducted among 253 mothers with children aged 0–24 months using a self-administered questionnaire. Eligible mothers were currently breastfeeding or had previously breastfed their child. Postnatal clinics were purposively selected, after which eligible mothers were randomly selected using a simple ballot method. Knowledge was categorised as poor (<40%), moderate (40–59%), good (60–79%), and excellent (≥80%). Data were analysed using IBM SPSS version 23 and presented as frequencies and percentages. Informed consent was obtained and ethical approval was obtained from the Research and Ethics Committee of the Federal Medical Centre, Umuahia.

**RESULTS AND DISCUSSION**: Knowledge scores showed that 66% of respondents had good or excellent knowledge of breastfeeding practices, 24.3% had moderate knowledge and 9.1% had poor knowledge. A total of 62.7% of respondents gave their infants water more than once daily during the first 6 months of life, 21% gave bitter kola water within the first 6 months of life, and 71.7% practised mixed feeding at the time of this study. Some mothers introduced complementary foods in line with recommendations while others introduced them earlier or later than recommended.

**Table 1: Assessment of breastfeeding practices among mothers attending public health facilities in Umuahia North L.G.A, Abia State**

| Parameter | Frequency | Percentage |
|---|---|---|
| **Current feeding pattern** | | |
| Only breastfeeding | 53 | 23.0 |
| Mixed (breastmilk and other food/liquids) | 165 | 71.7 |
| Formula feeding only | 12 | 5.3 |
| **Total** | 230 | 100 |
| **Frequency of giving water during the first 6 months** | | |
| Once daily | 1 | 0.4 |
| More than once daily | 153 | 63.5 |
| Once in a while | 6 | 2.5 |
| With hiccups | 12 | 5.0 |
| None | 69 | 28.6 |
| **Total** | 241 | 100 |
| **Frequency of giving bitter kola water in the first 6 months** | | |
| Once daily | 21 | 8.6 |
| More than once daily | 51 | 21.0 |
| Once a week | 1 | 0.4 |
| Once in a while | 1 | 0.4 |
| With hiccups | 4 | 1.6 |
| None | 165 | 68 |
| **Total** | 243 | 100 |

Note: Percentages were calculated based on the total valid responses for each parameter; totals varied because of missing responses.

**CONCLUSION**: The study showed that good knowledge does not always translate into optimal breastfeeding practices. Practices such as giving bitter kola water and other non-recommended substances during the first 6 months should be discouraged. Hence, there is a need for continued breastfeeding education and targeted behaviour-change communication by nutritionists, involving families and community institutions, including places of worship.

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**Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages**

**Title:** Household Food Insecurity, Dietary Diversity and Nutritional Status among Mother–Child Dyads: Implications for Maternal, Infant and Young Child Nutrition in North-Central Nigeria

Omachi B.A [1]*, Omachi P.A [2], Abiodun M.A [1], Van Onselen A [3]

[1] Department of Nutrition and Dietetics, The Federal Polytechnic Bida, Nigeria. [2] Department of Paediatrics, Federal Medical Centre Bida, Nigeria. [3] Department of Consumer and Life Sciences, University of South Africa, Pretoria, South Africa.

***Corresponding author* Email:** omalice80@gmail.com; Tel: +2348030939624

**Keywords:** Food insecurity; Dietary diversity; Anthropometric failure; Mother–child dyads

Highlights

- Household food insecurity affected 98.9% of study households.
- Household breadwinner status independently predicted anthropometric failure.
- Maternal overweight/obesity was associated with lower odds of anthropometric failure.

**BACKGROUND AND OBJECTIVES**: Household food insecurity contributes substantially to poor dietary quality and childhood undernutrition in Nigeria [1,2]. However, community-based evidence simultaneously examining household food insecurity, dietary diversity and nutritional status among mother–child dyads in North-Central Nigeria remains limited. This study assessed household food insecurity, maternal and child dietary diversity, nutritional status and determinants of anthropometric failure among mother–child dyads.

**MATERIALS AND METHODS:** A community-based cross-sectional study involving 450 mother–child dyads with children aged 36–59 months was conducted in Niger State using multistage sampling. Household food insecurity was assessed using the Household Food Insecurity Access Scale (HFIAS), while maternal and child dietary diversity were measured using the Minimum Dietary Diversity for Women (MDD-W) and Children (MDD-C), respectively. Maternal BMI was assessed using standard procedures, while child nutritional status was assessed using WHO growth standards based on height-for-age, weight-for-height and weight-for-age z-scores. The Composite Index of Anthropometric Failure (CIAF) was used to assess the overall burden of anthropometric failure based on the presence of stunting, wasting and/or underweight and their combinations [3]. Data were analysed using descriptive statistics, chi-square tests and multivariable logistic regression in SPSS version 27, with statistical significance set at $p < 0.05$.

**RESULTS AND DISCUSSION:** Household food insecurity was highly prevalent, affecting 98.9% of households, including 40.2% with severe food insecurity. This high burden of food insecurity was accompanied by suboptimal dietary diversity, with adequate dietary diversity reported among only 49.3% of mothers and 40.2% of children, consistent with findings from other sub-Saharan African populations [4,5]. The nutritional consequences were also substantial, as 48.0% of children were stunted, 21.1% were wasted, 38.7% were underweight, and 64.2% experienced anthropometric failure according to the CIAF [3].

Given this considerable burden of anthropometric failure, multivariable analysis was conducted to identify factors independently associated with the outcome. Household breadwinner status and maternal nutritional status emerged as significant factors. Children from households where the mother, both parents and/or a

grandparent was the breadwinner had 55% lower odds of anthropometric failure than those where the father alone was the breadwinner (AOR=0.45, 95% CI: 0.28–0.72; p=0.001). Similarly, maternal nutritional status was significantly associated with child anthropometric outcomes: children of overweight/obese mothers had 78% lower odds of anthropometric failure than those of underweight mothers (AOR=0.22, 95% CI: 0.07–0.69; p=0.010). In contrast, household food insecurity score, maternal and child dietary diversity, maternal education, meal expenditure and drinking water treatment were not independently associated with anthropometric failure [6].

These findings highlight the interconnected influence of household economic conditions and maternal nutritional status on child nutrition, while also demonstrating that the factors associated with anthropometric failure extend beyond food access and dietary diversity alone. They therefore support the need for integrated MIYCN approaches across the life course.

**Table 1. Household food insecurity, dietary diversity, nutritional status and independent predictors of anthropometric failure (CIAF) (N=450)**

| Variable | n (%) | AOR (95% CI) | p-value |
|---|---|---|---|
| Household food insecurity | | | |
| Food secure | 5 (1.1) | – | – |
| Mild | 73 (16.2) | – | – |
| Moderate | 191 (42.4) | – | – |
| Severe | 181 (40.2) | – | – |
| Adequate maternal dietary diversity | 222 (49.3) | 1.09 (0.73–1.65) | 0.667 |
| Adequate child dietary diversity | 181 (40.2) | 0.83 (0.54–1.28) | 0.402 |
| Child nutritional status | | | |
| Stunting | 216 (48.0) | – | – |
| Wasting | 95 (21.1) | – | – |
| Underweight | 174 (38.7) | – | – |
| Anthropometric failure (CIAF) | 289 (64.2) | – | – |
| Independent predictors | | | |
| Household breadwinner† | – | 0.45 (0.28–0.72) | 0.001 |
| Maternal overweight/obesity‡ | – | 0.22 (0.07–0.69) | 0.010 |

† Reference = Father only; ‡ Reference = Underweight; CIAF= Composite Index of Anthropometric Failure; AOR = Adjusted Odds Ratio; p-value <0.05

**CONCLUSION AND RECOMMENDATION(S):** Household food insecurity was nearly universal and was closely accompanied by poor dietary diversity and a high burden of child undernutrition. These findings suggest that inadequate household access to food may constrain the ability of families to provide diverse and nutritionally adequate diets for young children. Furthermore, the independent associations between household breadwinner status, maternal nutritional status, and anthropometric failure indicate that both household socioeconomic conditions and maternal nutritional well-being are important determinants of child nutritional outcomes. Therefore, addressing child undernutrition requires an integrated approach that goes beyond child-focused interventions to address the broader household and maternal factors that shape nutrition across the life course. Interventions should consequently prioritize integrated maternal, infant and young child nutrition (MIYCN) strategies that combine household food-security initiatives, economic empowerment, nutrition-sensitive social protection, improvement of maternal nutritional status, and appropriate child nutrition interventions. Such coordinated, multisectoral approaches may help strengthen household capacity to access and provide nutritious foods, improve maternal and child nutritional outcomes, and ultimately reduce the intergenerational cycle of malnutrition.

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**Theme/sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Infant Feeding Knowledge and Practices Among Mothers Exposed to Health Education Messages in An Immunization Clinic In Comprehensive Kofar Kaura, Katsina.

**Name of Author(s):** *Garba, H. Shamsuddeen I. 1

**Affiliation of Author(s):** 1Department of Public Health, National Open University of Nigeria, Katsina Study Centre

*Corresponding author, e-mail: garbahafsat48@gmail.com, +2348035750531

**Keywords:** Nutrition, young child, knowledge, colostrum

**Highlights**

- 85.0% of mothers exposed to clinic health education demonstrated overall good knowledge of infant and young child feeding (IYCF).
- 74.0% of mothers engaged in optimal infant feeding practices.
- Maternal educational level and occupation were statistically and significantly associated with feeding knowledge ($p < 0.05$).
- A clear knowledge-to-practice gap exists, indicating that knowledge acquisition requires targeted counseling reinforcement.

**BACKGROUND AND OBJECTIVES**
Appropriate infant feeding is critical for a child's health and survival [1]. Studies have shown high prevalence of malnutrition in Nigeria and other developing countries and this has been attributed to poor breast and complementary feeding practices [2]. Routine immunization clinics serve as vital, structured contact points for delivering facility-based health education messages in nutrition across key early life stages. This study evaluated the knowledge and practices of infant feeding among nursing mothers exposed to routine nutrition health education messages at the immunization clinic of Comprehensive Kofar Kaura, Katsina.

**MATERIALS AND METHOD**
A descriptive cross-sectional design was utilized to study 143 nursing mothers with infants aged 0–12 months selected via systematic random sampling. Data were gathered using a semi-structured questionnaire measuring socio-demographics, exposure to clinic-based nutrition education, breastfeeding knowledge, and complementary feeding practices. "Good knowledge" and "good feeding practices" were explicitly scored and defined as achieving a threshold score of \ge 70\% across standardized IYCF indicators. Data analysis was performed using SPSS, applying descriptive statistics (frequencies and percentages) alongside Chi-square tests to determine associations between socio-demographic variables and knowledge levels at a significance threshold of $p < 0.05$.

**RESULTS AND DISCUSSION**
All respondents knew breast milk as the first meal for an infant. The majority (68%) of the respondents fed their infants with colostrum and most (73.7%) of them practiced exclusive breastfeeding. Almost two-thirds (63.6%) of the respondents knew that complementary foods should be introduced at 6 months. Overall, 85% of mothers had a good knowledge of infant and young child feeding while 74% engaged in good feeding practices. Educational levels and occupation were significantly associated with knowledge of infant feeding.

**Table 1:** Knowledge and practice of infant feeding among respondents (n = 143)

| Variables | Frequency (n) | Percentage (%) |
|---|---|---|
| Colostrum feeding | 97 | 68.0 |
| Exclusive breastfeeding practice | 105 | 73.7 |
| Knowledge of complementary feeding age (6 months) | 91 | 63.6 |
| Overall Good Knowledge of IYCF | 122 | 85.0 |
| Overall Good Feeding Practices | 106 | 74.0 |
| First meal recognized as breast milk | 143 | 100.0 |

## CONCLUSION AND RECOMMENDATION(S)

The respondents were knowledgeable in good infant feeding, but actual practices were not as high as knowledge levels. Routine health education effectively builds maternal knowledge, but communication between health workers and mothers must be strengthened through individualized counseling to bridge the knowledge-to-practice gap.

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**Theme/sub-theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, & Sectors / MIYCN as a Veritable Framework for Delivering Nutrition-Specific and Sensitive Interventions Across Life Stages

**Title:** Effect of MIYCN Training for Frontline Health Workers on Dietary Diversity and Nutritional Status of Children Aged 6–59 Months in Kaduna State, Nigeria

**Name of Author(s):** _Shanu A.M.[1], Mbochi A.L.C.[1], Safiya T.A.[2], Musa R.H.[3], Agboola F.O.[1], Musa F.N.[4] and Kurmi A.P.[2]

**Affiliation of Author(s):**

[1]Department of Nutrition and Dietetics, Shehu Idris College of Health Sciences and Technology, Makarfi, Kaduna State. [2]Department of Nutrition and Dietetics, Kaduna Polytechnic. [3]Directorate of Nutrition, Kaduna State Primary Health Care Board, Kaduna. [4]Department of Nutrition and Dietetics, College of Health Technology, Minna.

**Corresponding author, e-mail:** yaanoh@yahoo.com, +234 802 862 0072

**Keywords:** MIYCN, nutrition education, dietary diversity, frontline health workers

**Highlights**

- MIYCN training significantly improved nutrition education delivery scores
- Minimum dietary diversity was 74.5% in intervention vs 48.3% in comparison
- Undernutrition prevalence was lower in LGAs with trained health workers

**BACKGROUND AND OBJECTIVES**

Despite evidence that MIYCN training improves feeding practices, undernutrition persists in Nigeria and state-level data from Kaduna are limited. This study evaluated the effect of MIYCN training for frontline health workers on nutrition education delivery, children's dietary diversity, and nutritional status among children aged 6–59 months in Kaduna State.

**MATERIALS AND METHODS**

A statewide quasi-experimental, non-equivalent control group study was conducted across 15 LGAs in Kaduna State. Eight LGAs were assigned as intervention and 7 as comparison. Frontline health workers in intervention LGAs received a 5-day competency-based MIYCN training on IYCF, nutrition counselling and growth monitoring, plus 6 months of monthly supportive supervision. Comparison LGAs continued routine services. The study involved 150 health workers/caregivers and 2,145 children aged 6–59 months. Baseline and post-intervention data were collected 3 months after training using structured questionnaires, observation checklists, 24-hour dietary recall, and anthropometry. Dietary diversity and nutritional status were assessed using WHO guidelines. Data were analyzed with IBM SPSS Version 26. Statistical significance was set at $p < 0.05$.

**RESULTS AND DISCUSSION**

Nutrition education delivery scores were significantly higher in the intervention than comparison group ($89.76 \pm 1.05$ vs. $75.58 \pm 1.43$; $p = 0.001$). Overall, 82.4% of caregivers in intervention LGAs received nutrition education during clinic visits.Mean dietary diversity score was significantly higher in the

intervention group (6.10 ± 1.44 vs. 5.11 ± 1.43; p = 0.001). Minimum dietary diversity was achieved by 74.5% of children in intervention LGAs compared to 48.3% in comparison LGAs (p = 0.001) as shown in Table 1. Post-intervention, the prevalence of stunting, wasting and underweight was lower in intervention LGAs compared to comparison LGAs as shown in Figure 1.

Table 1: Summary of Key Findings Between Intervention and Comparison Groups

| Indicators | Intervention | Comparation | P-value |
|---|---|---|---|
| Nutrition education delivery, mean ± SD | 89.76 ± 1.05 | 75.58 ± 1.43 | 0.001 |
| Dietary diversity score , mean ± SD | 6.10 ± 1.44 | 5.11 ± 1.43 | 0.001 |
| Children achieving minimum dietary diversity, % | 74.5 | 48.3 | 0.001 |

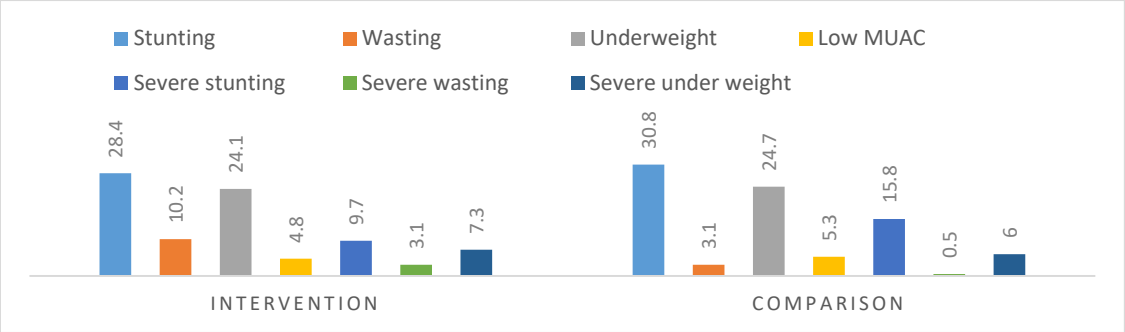



Figure 1: Prevalence of Undernutrition Among Children 6-59 Months Post-Intervention

The improved outcomes in intervention LGAs are consistent with evidence that competency-based MIYCN training enhances health worker capacity and improves child feeding practices. These findings support WHO recommendations on continuous nutrition counselling as a strategy to reduce malnutrition.[1][2][3].

## CONCLUSION AND RECOMMENDATION(S)

**Conclusion:** MIYCN training for frontline health workers significantly improved nutrition education delivery, dietary diversity, and nutritional status of children aged 6–59 months in Kaduna State.

**Recommendation:** Scale-up of MIYCN training for all frontline health workers, coupled with supportive supervision and routine monitoring, is recommended to sustain programme gains and reduce child malnutrition in Kaduna State.

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**Theme/sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title: Artificial Intelligence in Maternal and Child Nutrition: Evidence and Implications for Nigeria and Other Low- and Middle-Income Countries**

**Name of Author(s):** *Nnedu, C.V.*[1]

**Affiliation of Author(s):** [1]Department of Human Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu, Nigeria.

**Email and phone number of the corresponding author:**
*Corresponding author: e-mail: nneduvivianjessica@gmail.com; +2347044188441

**Keywords:**
Artificial intelligence; maternal nutrition; child nutrition; Nigeria

**Highlights**

- AI may strengthen nutrition screening, counselling and growth monitoring.
- African evidence remains limited and requires local validation.
- Governance and local datasets are essential for equitable deployment.

## BACKGROUND AND OBJECTIVES

Maternal and child undernutrition remains a major public health problem in sub-Saharan Africa, including Nigeria, despite established nutrition interventions[1]. Artificial intelligence (AI), including machine learning, computer vision and natural language processing, is increasingly being explored to support nutrition risk prediction, growth monitoring, dietary assessment, infant and young child feeding (IYCF) counselling and referral across the first 1,000 days [2,4]. However, evidence on the relevance, performance and implementation of these tools in Nigeria and other low- and middle-income countries (LMICs) remains fragmented.

This narrative review synthesized evidence published from 2019 to 2026 on AI applications in maternal and child nutrition. It examined reported performance, validation and implementation readiness; identified data, infrastructural and governance gaps; and proposed priorities for applying AI within maternal, infant and young child nutrition (MIYCN) programmes in Nigeria and similar LMICs.

## REVIEW METHODOLOGY

A structured literature search was conducted in PubMed/MEDLINE, Scopus, Web of Science, CINAHL and Google Scholar for studies published from January 2019 to July 2026, supplemented by searches of WHO, UNICEF and relevant development and survey repositories. Searches combined AI-related terms with maternal and child nutrition, including stunting, wasting, infant and young child feeding, dietary assessment and nutrition counselling, with emphasis on Nigeria, Africa and LMICs. Eligible studies included primary research, reviews and substantive reports examining AI, machine learning, computer vision or natural language processing for nutrition assessment, prediction, monitoring, counselling or antenatal risk stratification among pregnant/lactating women, infants and children. Studies focused solely on adults or non-AI digital interventions were excluded. Due to heterogeneity in study designs, populations and outcomes, findings were synthesised narratively and grouped by application area.

## SYNTHESIS OF EVIDENCE AND DISCUSSION

The literature covered five main application areas. First, machine-learning models applied to Demographic and Health Survey and Multiple Indicator Cluster Survey data have been used to predict stunting, wasting and underweight. A meta-analysis of 11 studies reported pooled accuracy of approximately 69% for stunting, 84% for wasting and 74% for underweight, but heterogeneity was very high and external validation in African settings was limited [3]. Nigerian studies exist but remain limited in scale and validation. Second, computer-vision tools use smartphone images to estimate child height, length or MUAC and support growth monitoring [4]. Early evidence suggests potential for community screening, although performance under routine Nigerian conditions remains uncertain. Third, image-based dietary assessment can classify foods and estimate portion sizes and nutrient intake. Performance declines with culturally diverse foods and free-living conditions. The absence of large, locally representative Nigerian food-image datasets is an important limitation. Fourth, conversational AI has been used to provide IYCF counselling, particularly in humanitarian settings. The Harmony of Parenthood initiative in Ukraine illustrates the potential of supervised chatbots to extend counselling access while demonstrating the need for human oversight and referral pathways [4]. Fifth, AI has been applied to antenatal risk stratification for gestational diabetes, anaemia and low birth weight. African and Nigerian populations remain under-represented in model development and validation. Across these areas, the main concerns are limited external and prospective validation, possible algorithmic bias from non-African training data, inadequate representation of local foods and languages, weak interoperability, data-protection challenges and unequal digital access.These challenges reinforce the need for privacy, accountability, appropriate human oversight and equitable implementation of AI in health, AI should therefore support, rather than replace, nutrition professionals and community health workers **[5]**.

## CONCLUSION AND RECOMMENDATIONS

AI has potential to strengthen MIYCN delivery through early risk identification, growth monitoring, dietary assessment, IYCF counselling and referral. However, evidence for Nigeria and comparable LMICs remains promising but immature. Nigeria should prioritise locally validated models, representative food and anthropometric datasets, prospective implementation studies within primary healthcare, and governance standards addressing privacy, bias, accountability and human oversight. AI should complement not replace proven interventions such as adequate maternal diets, breastfeeding support, appropriate complementary feeding, safe water and sanitation, and health-system strengthening.

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**Theme/Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Breastfeeding Knowledge and Intent among Pregnant Women Attending Antenatal Clinics in Selected Primary Healthcare Centres in Ibadan, Oyo State

**Name of Author(s):** Adefisayo, K.A.[1]

**Affiliation of Author(s):** [1]Department of Dietetics, University College Hospital (UCH), Ibadan, Oyo State, Nigeria

Corresponding author, e-mail: kennyidowu444@gmail.com, +2348139364610

**Keywords:** Breastfeeding knowledge; Exclusive breastfeeding intent; Pregnant women; Antenatal clinics

**Highlights**

- 81.1% of pregnant women received prior exposure to breastfeeding education.
- 50.8% of the respondents possessed inadequate overall breastfeeding knowledge.
- 66.7% of participants intended to exclusively breastfeed their babies for six months.

**BACKGROUND AND OBJECTIVES**

Maternal breastfeeding knowledge and prenatal intentions are key determinants of optimal breastfeeding practices [1]. Despite global and national campaigns, exclusive breastfeeding (EBF) rates remain suboptimal in Nigeria [2]. This study assessed the breastfeeding knowledge and intents of pregnant women attending antenatal clinics in selected Primary Healthcare Centres (PHCs) in Ibadan, Oyo State.

**MATERIALS AND METHOD**

A descriptive cross-sectional design utilizing a multi-stage sampling technique was employed to recruit 201 registered pregnant women across selected PHCs in three Local Government Areas (Lagelu, Ibadan North-East, and Ibadan North-West) of Ibadan. Data on socio-demographic characteristics, breastfeeding knowledge, and EBF intentions were gathered using a validated, structured researcher-developed questionnaire. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 25.0, with results summarized using descriptive statistics such as frequencies and percentages.

**RESULTS AND DISCUSSION**

A total of 201 pregnant women participated. Most respondents were aged 25–29 years (32.3%), married (88.6%), and possessed secondary education (62.7%). Overall, 81.1% had received prior breastfeeding education, primarily from hospital sources (65.2%). While 77.6% correctly identified early initiation of breastfeeding (within 1 hour of birth), 56.2% could not describe colostrum, 55.7% incorrectly believed breast milk alone is insufficient for the first 6 months, and 51.2% wrongly believed water should be introduced before 6 months. Overall, 50.8% demonstrated inadequate breastfeeding knowledge (Table 1).

Conversely, breastfeeding intentions were high: 96.0% strongly planned to try breastfeeding, and 66.7% strongly intended to practice EBF for up to 6 months. The disconnect between high EBF intent and inadequate knowledge is consistent with findings among female young adults in Ibadan, where good intent did not always correspond with adequate knowledge [3]. This corroborates evidence that maternal knowledge is one of several factors, alongside socio-demographic and health-system factors, shown to affect breastfeeding intention [4]. A comparable study among pregnant women in South-Western Nigeria similarly reported a knowledge-intent gap [5], suggesting that while routine hospital education inspires positive intent, the educational content may lack detailed instruction, or mothers may miss sessions due to late antenatal booking.

**Table 1**

*Key Breastfeeding Knowledge and Intent Parameters Among Respondents (N = 201)*

| Parameter | Response Category | Frequency (N) | Percentage (%) |
|---|---|---|---|
| Previous Breastfeeding Education | Yes | 163 | 81.1 |
| | No | 38 | 18.9 |
| Overall Knowledge Score | Good Knowledge | 99 | 49.2 |
| | Poor/Inadequate Knowledge | 102 | 50.8 |
| Water Introduction Timing | Before 6 months | 103 | 51.2 |
| | After 6 months | 98 | 48.8 |
| Intent to EBF for 6 Months | Strongly Agree | 134 | 66.7 |
| | Strongly Disagree | 41 | 20.4 |

## CONCLUSION AND RECOMMENDATION(S)

Although expectant mothers attending PHCs in Ibadan exhibit strong intentions to breastfeed exclusively, more than half possess inadequate knowledge, which may prevent this intent from translating into sustained EBF practice post-delivery. It is recommended that healthcare administrators review and upgrade antenatal education packages, ensuring delivery by trained specialists, and that longitudinal follow-up studies evaluate whether prenatal intentions translate into actual EBF practices.

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**Theme/sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

**Title: Food Security, Dietary Diversity and Nutritional Status of Pregnant women in Ekiti State**

**Name of Author (s): Dada I. O.[1], Gwadza P. M[1], and Adedayo E. O.[1, 2]**

**Affiliation of author:** [1]Department of Human Nutrition and Dietetics, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria.

[2]Rufus Giwa Polythenic, Owo, Ondo State

***Correspondence Author:** iodada@abuad.edu.ng, +2348034403887

**Keywords:** Dietary diversity, Food security, Nutritional status, Pregnant Women

**Highlights**

- Pregnant women had high dietary diversity. However, more than half were anaemic
- One-third of pregnant women were food insecure and above one-third were malnourished
- Food security was strongly associated with nutritional status (MUAC and PCV)

## BACKGROUND AND OBJECTIVES

Maternal malnutrition is a significant public health challenge worldwide. An estimated 37% and 50% of pregnant women are anemic globally and in Nigeria respectively [1, 2]. This study assessed the food security, dietary diversity and nutritional status of pregnant women in Ekiti state

## MATERIALS AND METHODS

**Study Design, Area and Population:** This study used a cross-sectional design and it was carried out in Ekiti State among 342 pregnant women selected using multistage sampling technique

**Data Collection:** Household food insecurity access scale and Minimum dietary diversity score for women (MDD-W) were used to assess food security and dietary diversity. Nutritional status was established using mid upper arm circumference (MUAC) and packed cell volume (PCV)

**Data Analysis:** Data were analysed using SPSS software

## RESULTS AND DISCUSSION

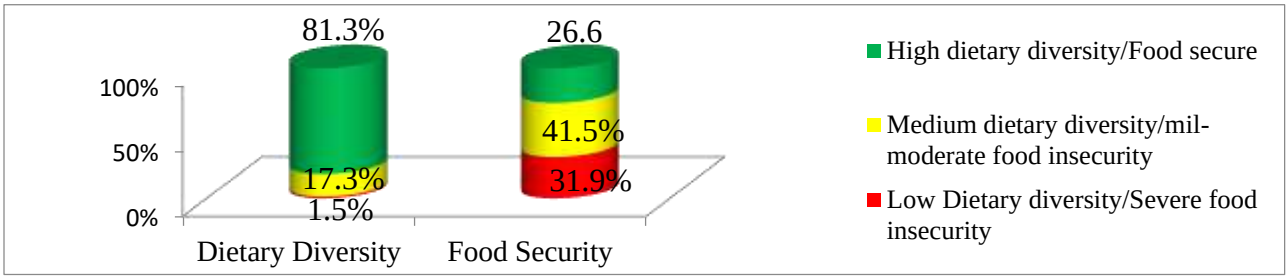



**Figure 1: Dietary diversity and food security of pregnant women**

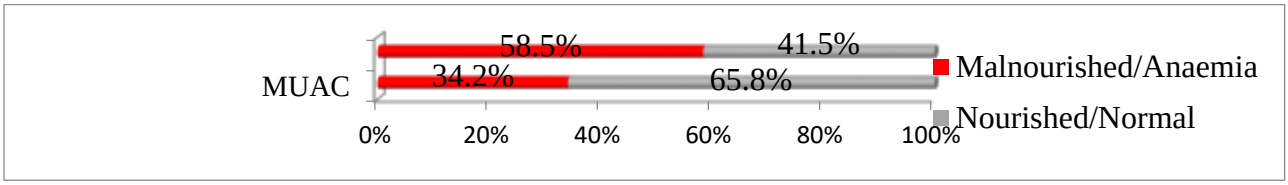



**Figure 2: Nutritional status of pregnant women**

The high dietary diversity (9-12 food groups) suggests that pregnant women consumed foods from a wide range of food groups. Adequate dietary diversity improves health, fetal growth, immune function and pregnancy outcomes [3]. Despite the high dietary diversity, one-third of the respondents were food insecure. Food insecurity during pregnancy result to anaemia, poor gestational weight gain and poor birth outcomes [4]. The finding revealed a high prevalence of malnutrition and anaemia. Maternal under-nutrition and anaemia is associated with postpartum haemorrhage, maternal mortality and also poor birth outcomes [5].

## CONCLUSION AND RECOMMENDATION

Food insecurity, anaemia and malnutrition were highly prevalent among pregnant women in the study despite the high dietary diversity. Nutrition specific intervention such as micronutrient supplementation and bio-fortification are necessary

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**Theme/subtheme:** **MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

**Title:** **Food Baskets as Non-Monetary Incentives for Research Participation among Pregnant Women in Nigeria: Lessons from the ENHANCE-CVH Study**

**Authors:** *Ezema, VU[1,5], Ojji, DB[1,6], Huffman, MD[2,3], Okoro, CE[1,4,5], Ocholi, E[1,8], Ojji, OI[1,8], Adesope, A[1], Onoenyi, CS[1], Chidebe, C[1], Fiase, P[1], Kumode, S[1], Yakubu, L[1], Ekwueme, CC[1,7], Chijioke, J[1], Owoade, O[1,] Shikel, J[1], Nwokoye, PA[1]

**Author's Affiliation** [1]Cardiovascular Research Centre, University of Abuja Teaching Hospital, University of Abuja, FCT-Abuja, Nigeria

[2]Washington University in St. Louis, United States

[3]The George Institute for Global Health, University of New South Wale, Sydney, Australia,

[4]Food and Nutrition Department, Federal Ministry of Budget and Economic Planning, Abuja, Nigeria

[5]Department of Nutrition and Dietetics, University of Nigeria Nsukka, Enugu State, Nigeria

[6]Department of Internal Medicine, University of Abuja, Abuja, Nigeria

University of Abuja Teaching Hospital, Abuja, Nigeria

[7] Nutrition Division FCT-Primary Health Care Board

[8] Department of Guidance and Counselling, University of Abuja

**Corresponding author:** Ugovinnwa@gmail.com, 08063931959

**Keywords:** Malnutrition, Research Incentives, Food baskets, Pregnancy

**Highlights:**

- Beneficiaries noted the baskets supported overall household food supply.
- Food baskets were perceived good alternative non-monetary incentive.
- Careful planning is required for effective implementation of food basket distribution

## BACKGROUND OF THE STUDY

Inadequate nutrition in pregnancy affects the overall pregnancy outcome. Malnutrition in pregnancy could lead to lose of pregnancy and low birth weight [1]. Pregnancy comes with a lot of physiological changes due to the developing foetus [2] During this developmental stage, nutrition is crucial, and since it determines the lifelong risk of disease, it may be a modifiable risk factor [3].

Retaining pregnant women in longitudinal and community-based studies has been reported to be challenging [4]. However, participants retention is critical for data validity and study success. While incentives ranging from cash to non-cash benefits are commonly used to boost participation, monetary rewards can raise ethical concerns [5]. Research participants may take risks that they should not or would not take in the absence of monetary payment. Particularly in low-income settings, large cash payments may constitute an undue inducement, potentially compromising the validity of voluntary consent.

The provision of food baskets served as a food-based non-monetary research incentive with potential nutrition-sensitive benefits for pregnancy, a critical window within the first 1,000 days with potential implications for maternal, child, and lifelong health outcomes. Although incentives are commonly used to improve recruitment and retention in research, there is dearth information on the acceptability, feasibility and perceived benefits of food-based non-monetary incentives among pregnant women in Nigeria remains limited, we replaced cash with food baskets as the primary participant incentive in the ENHANCE study.

## OBJECTIVE OF THE STUDY

The objective of the study is to share experience on food baskets as non-monetary incentives for research participation among pregnant women in Nigeria: lessons from the ENHANCE-CVH study.

## MATERIALS AND METHOD

The study is a cluster randomized one in 40 primary health care (PHC) facilities across the 6 Area Councils of Federal Capital Territory (FCT) Abuja. Participants included 1000 pregnant women with body mass index of not less than 26kg/$m^2$. Trained community health extension workers distributed the food baskets to the participants during their antenatal care visits. Each food basket contains locally available staples including legumes, cereals, oil, fish products, fruits and vegetables. A descriptive phenomenological qualitative sub-study design, nested within the trial was used to explore beneficiaries' testimonies regarding the replacement of monetary incentives with food baskets.

## RESULTS AND DISCUSSION

Participants testified that the food baskets as providing household food support, noting that the baskets supported household food supply, improved trust between participants and researchers, and reminded them of nutrition education messages. One participant emphasized the household-level benefit of the intervention, stating that the food "fed my whole family, not just me." This underscores how food assistance benefits extend beyond the individual recipient to the broader household. Another participant remarked that "money finishes but food stays". This suggests that food base incentives may be perceived as more sustainable and family oriented than cash. Some operational challenges were identified initially which included procurement logistics, storage constraints, perishability.

## CONCLUSION AND RECOMMENDATIONS

This study suggests that non-monetary incentives such as food baskets can be used as an incentive for studies involving pregnant women in Nigeria, and seems to align well with local needs. It however requires careful and operational planning to ensure continuous positive outcome. It is recommended that food baskets should be explored in maternal health studies in Nigeria as it seems to address household food insecurity.

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**Theme: MIYCIN as a Veritable Framework for Delivering Nutrition Sensitive and Specific Interventions Across Life Stages**

Title: Effect Of Nutrition Education Intervention On Dietary Diversity Among Pregnant Women In Federal Capital Territory Abuja

**Authors: Okoro, CE[1,2,3], *Ezema, V.U[1,3], Nnam, NM[1], Ngwu, E.K[1], Maduforo, A.N[1,4,5], Ayogu, RNB[1], Ojji, DB[6,7]**

**Affiliation of Authors:**

[1]Department of Nutrition and Dietetics, University of Nigeria Nsukka, Enugu State, Nigeria

[2]Food and Nutrition Department, Federal Ministry of Budget and Economic Planning, Abuja, Nigeria

[3]Cardiovascular Research Centre, University of Abuja Teaching Hospital, University of Abuja, FCT-Abuja, Nigeria

[4]Department of Educational Psychology and Leadership Studies, Faculty of Education, University of Victoria, Victoria, British Columbia, Canada

[5]Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada

[6]Department of Internal Medicine, University of Abuja, Abuja, Nigeria

[7]University of Abuja Teaching Hospital, Abuja, Nigeria

**Corresponding author's email and phone number:** Ugovinnwa@gmail.com, 08063931959

**Keywords: Nutrition, Dietary diversity, Nutrition education, Intervention**

**Highlights;**

- Dietary diversity was improved by nutrition education
- Nutrition education is a key factor in improving Maternal nutrition

**Background:** Dietary diversity increases the uptake of diverse nutrients. It is defined as the consumption of a wide variety of foods from different food groups to ensure a balanced and comprehensive intake of essential nutrients [1]. The diet of pregnant women needs to be carefully considered throughout the gestation period and while she lactates [2]. Nutrition at this stage is very important, because during pregnancy, any nutritional damage may be permanent or extremely difficult to reverse; thus, it is important to follow an ideal diet and address any nutritional shortfalls early. Nutrition generally plays a greater role in determining the positive or negative outcome of pregnancy [3]. A poorly nourished mother is more likely to give birth to a child with compromised physical and cognitive development [4]. According to reports, maternal and child undernutrition account for more than one-third of child mortality [5]. In FCT, there are several interventions to improve maternal nutrition, which include the maternal, newborn and child health week program, free multiple micronutrient supplementation (MMS) during antenatal and other services. However, there is a paucity of information on the effect of nutrition education on dietary diversity, which is one of the sustainable ways to improve maternal nutrition.

**Objectives of the study:** The objective of the study was to assess the effect of nutrition education intervention on dietary diversity among pregnant women in the Federal Capital Territory, Abuja

**Materials and Methods:** The study utilized a multiple-method research design, combining survey and quasi-experimental design in studying the effect of nutrition education on dietary diversity among 627 pregnant women in FCT, out of which a sub-sample of 136 were selected for 3 months nutrition education intervention. Statistical Package for Service Solution (SPSS), version 27, was used to analyse the data and $p < 0.05$ was considered significant.

**Results**. The results showed that most respondents (32.9%) were aged 25-29 years and 30-34 years (30.0%), with a mean age of 28.9 ± 5.2 years. Most (97.4%) were married and the average age at marriage was 23.8 ± 4.6 years. Pre-intervention results show a 61% prevalence of minimum dietary diversity among pregnant women in FCT. Conversely, post-intervention results revealed a significant ($p < 0.05$) increase in the proportion of those who met minimum dietary diversity from 61% to 86.8%.

**Table 1.1: Dietary Diversity Score of Respondents Pre- and Post-intervention**

| | **DD post-intervention** | | |
|---|---|---|---|
| **DD pre-intervention** | Good | Poor | Total |
| | N (%) | N (%) | N (%) |
| Good | 76 (91.6) | 7 (8.4) | 83 (61.0) |
| Poor | 42 (79.2) | 11 (20.8) | 53 (39.0) |
| Total | 118 (86.8) | 18 (13.2) | 136 (100.0) |
| *McNemar $\chi^2 = 25.000$; p-value 0.001** | | | |

**Conclusion and Recommendation:** Nutrition Education intervention in the community remains one of the potent solutions to increasing nutrition awareness and improving nutrition quality of citizens, especially the vulnerable groups, of which pregnant women are part of. Antenatal care (ANC) package should encompass a well-structured nutrition education in which mothers will constantly be given flip cards to help them understand the teaching more.

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# SUB-THEME 2: POSTER

**Theme/subtheme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages

**Title**: Diet Quality of Pregnant Women in Selected Hospitals in Ogbomoso, Oyo State

**Name of Authors:** ADEMOLA, F.E., and *ORONIRAN O.O.

**Affiliation of Authors:** Department of Nutrition and Dietetics, Bowen University

*email: oluyinkaoroniran@gmail.com

**Key Words:** Pregnant women, Diet quality, non-communicable disease risk factor

**Highlight:** A high percentage of the pregnant women consumed all five food groups with NCD risk score of 3.5.

**BACKGROUND AND OBJECTIVES:** Adequate nutrition during pregnancy promotes maternal and child health outcomes. Generally, a diet with good quality during pregnancy provides optimum maternal weight gain, protects against maternal anemia, reduces preterm delivery, and improves birth weight [1]. Several adverse health outcomes resulting in non-communicable diseases globally has been linked to poor diet quality [2,3] and inadequate maternal diet quality or poor foetal nutrition during pregnancy subsequently lead to pregnancy complications and birth defects such as neural tube defects [4], low birth weight, still birth and even health problems in adult life. Hence this study aimed at assessing the diet quality and the non-communicable disease risk factor of pregnant women attending antenatal in selected hospitals in Ogbomoso, Oyo State.

**MATERIALS AND METHODS:** A total of 174 willing, available and consenting pregnant women who enrolled and attended antenatal clinic in four selected hospitals at Ogbomoso during the period of the study were recruited for the cross-sectional study. A self-administered Diet Quality Questionnaire adapted from the Global Diet Quality Project (2025) was used to assess the diet quality of respondents. Diet Quality Indicator Calculator was used for analyzing the data.

**RESULTS AND DISCUSSION:** Respondents had adequate consumption of diversified food groups within the 24-hour reference period. More than half, 63%, of the respondents (n = 174) consumed all five recommended food groups (at least one vegetable, fruit, pulse, nut or seed, animal-source food and starchy staple). About 95% included at least one fruit or vegetable in their meals (Table 1) while 68%, 51% and 21% consumed, pulse, nuts or seed and whole grain respectively. About 97% had starchy staple, and only 5% neither consumed vegetable or fruit in their diet. The respondents had dietary diversity score of 7.3, non-communicable disease protect score of 4.7, and Non-communicable disease risk score of 3.5 which may be due to their consumption of energy-dense and highly processed foods.

**Table 1: Aggregate of Respondents on Diet Quality**

| VARIABLES | FREQUENCY (N=174) | PERCENTAGE (%) |
|---|---|---|
| **All-5** | 110 | 63 |
| Consumes at least one vegetable | 157 | 90 |
| Consumes at least one fruit | 148 | 85 |
| Consumes at least one pulse, nut or seed | 141 | 81 |
| Consumes at least one animal-source food | 171 | 98 |
| Consumes at least one starchy staple | 169 | 97 |
| **Consumption of other food groups** | | |
| At least one vegetable or fruit | 165 | 95 |
| Pulse consumption | 118 | 68 |
| Nuts or seeds consumption | 89 | 51 |
| Whole grain consumption | 37 | 21 |
| Processed meat consumption | 33 | 19 |
| Salty or fried snack consumption | 111 | 64 |
| Deep fried food | 84 | 48 |
| Sweet foods consumption | 106 | 61 |
| Soft drinks (sodas, energy drinks, sports drinks) | 84 | 48 |
| **Zero vegetable or fruit consumption** | 8.7 | 5 |

**CONCLUSION AND RECOMMENDATION:** Most of the respondents consumed varieties of foods from all essential five food groups however, intake of highly-processed and sugary foods, still exist which could lead to the onset of non-communicable diseases. Effect of excessive consumption of highly processed and low nutrient-dense foods on foetal and maternal health outcomes should be emphasized at every antenatal clinic.

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**Sub-theme**: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title**: Nutritional Status, Feeding Pattern and Types of Complementary Foods of Children Aged 6-24 Months in Ogbomoso North Local Government Area, Oyo State, Nigeria.

**Name of Author(s):** *Alabi, O.D.[1], Adeyemo, G.A.[1], Oyewale, M.A.[1], Oyetunde, Y.S.[1] and Ogundare, B.E.[1]

**Affiliation of Authors**: [1]Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.

***Corresponding author**, e-mail: odalabi47@lautech.edu.ng, +2347081922786

**Keywords:** Complementary feeding, Infant nutritional status, Stunting, Underweight

**Highlights:** High wasting (33%), stunting (42%) and underweight (53%) in children

- Maize (98.5%) and rice (91.9%) dominated complementary diets.
- Household income and marital status predicted WAZ (underweight) and MUACZ (acute malnutrition).

**BACKGROUND AND OBJECTIVES**: Adequate infant nutrition during the complementary feeding period is essential for growth, cognitive development, and immunity. Yet, feeding practices in many Nigerian communities remain inadequate due to limited maternal knowledge, cultural beliefs, and limited access to diverse foods [1]. This study assessed the nutritional status, feeding patterns, and types of complementary foods of children aged 6–24 months in Ogbomoso North Local Government Area.

**MATERIALS AND METHODS**: A stratified cross-sectional design was employed in Ogbomoso North LGA. Two hundred (200) mother-child pairs were purposively selected from five wards at primary health centres. Sample size was calculated using the Cochran formula (p=50%, d=0.05, plus 10% attrition). Data collection involved a structured questionnaire with open- and closed-ended items capturing socio-demographic characteristics, infant feeding practices and food consumption frequency. Anthropometry measurements were done using standard procedures. WHO Anthro standards were used to compute WHZ (wasting), HAZ (stunting), WAZ (underweight) and MUACZ (acute malnutrition). Data were analysed with SPSS version 27 and the chi-square test at $p < 0.05$. Ethical approval was obtained from the LAUTECH Ethical Review Committee.

**RESULTS AND DISCUSSION**: The 200 infants had a mean age of 12 ± 4 months, a mean weight of 7.26 ± 1.15 kg, a mean height of 69.5 ± 5.9 cm and a mean MUAC of 13.1 ± 1.1 cm; 52.5% were female and 47.5% male. Exclusive breastfeeding for six months was reported by 90.5% of respondents, while 9.5% introduced foods earlier. Feeding frequency was generally adequate, with 82% of infants fed 5–6 times daily, and spoon feeding was the commonest feeding method at 78%. Complementary feeding was dominated by starchy staples, especially maize (98.5%) and rice (91.9%), with minimal inclusion of fruits, vegetables, and fortified foods. Anthropometric assessment revealed a high burden of malnutrition: 33% wasted, 42% stunted, 53% underweight, and 23.5% acutely malnourished by MUAC. WHZ and HAZ had no significant association with sociodemographics ($p>0.05$). However, WAZ was significantly associated with household monthly income ($p=0.034$) and marital status ($p=0.028$), and MUACZ with household income ($p=0.008$), marital status ($p=0.002$), household size ($p=0.027$), and infant's birth position ($p=0.000$). Type of complementary food was associated with household size ($p=0.000$) and infant position ($p=0.005$).

Table 1: Anthropometric Measurement of the Infants

| Indicator | Severe (<−3 SD) | Moderate (−3 to −2 SD) | Normal (≥−2 SD) | Overweight /Obesity |
|---|---|---|---|---|
| Weight-for-Height | 18 (9.0%) | 48 (24.0%) | 132 (66.0%) | 2 (1.0%) / 0 (0.0%) |
| Height-for-Age | 56 (28.0%) | 28 (14.0%) | 116 (58.0%) | – |
| Weight-for-Age | 35 (17.5%) | 71 (35.5%) | 94 (47.0%) | 0 (0.0%) |
| MUAC-for-Age | 8 (4.0%) | 39 (19.5%) | 153 (76.5%) | – |

**CONCLUSION AND RECOMMENDATION**: Despite a high rate of exclusive breastfeeding (90.5%), infants (6-24 months) in Ogbomoso North faced a high burden of wasting (33%), stunting (42%), underweight (53%) and acute malnutrition by MUACZ (23.5%), primarily due to poor dietary diversity dominated by maize and rice. Household income, marital status, household size and birth order were significant predictors. There is an urgent need for community-based nutrition education focusing on dietary diversity, affordable, nutrient-dense local foods, and food fortification, as well as economic empowerment and improved growth monitoring at public health centres (PHCs).

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**SUB THEME 2:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Impact of Maternal, Infant and Young Child Nutrition (MIYCN) Training on Health Worker Performance, Nutrition Indicators, and Vitamin A Status in Kaduna State, Nigeria: A Quasi-Experimental Evaluation

Mbochi A.L.C.[1]*, Safiya T.A.[2], Muhammad-Idris Z.K.[3], Dakare M.[4], Musa R.H.[5], Shanu A.L.[1], Agboola F.O.[1], Hajara J.U.[2] and Fademowo S.[2].

[1]Department of Nutrition and Dietetics, School of Environmental Health, SICHST, Makarfi, Kaduna State, [2]Department of Nutrition and Dietetics, College of Science and Technology, Kaduna Polytechnic, [3]Department of Community Medicine, Faculty of Clinical Sciences, College of Medicine, KASU. [4]Department of Biochemistry, Faculty of Life Sciences, College of Science, Computing and Engineering (CSCE), KASU. [5]Department of Nutrition, Kaduna State Primary Health Care Board.

Corresponding Email: mbochi4life@gmail.com. Phone number: 08027410514

Keywords: Maternal, Infant and Young Child Nutrition (MIYCN); Health worker performance; Nutrition indicators; Vitamin A status; Vitamin A supplementation; Micronutrient status; Quasi-experimental study; Kaduna State.

Highlight

13. MIYCN training significantly improved health worker performance (p=0.001)
14. High vitamin A coverage (89%) with adequate serum retinol levels (1.48 µmol/L)
15. Lower stunting (25.8%) and wasting (2.4%).

Background: Maternal, Infant and Young Child Nutrition (MIYCN) interventions improve infant feeding, micronutrient intake and nutrition counselling, thereby reducing maternal and child malnutrition [1] However, childhood under-nutrition remains a major public health challenge in Nigeria, with stunting, wasting and underweight prevalence of 37%, 7% and 22%, respectively [2]. Although competency-based nutrition training improves nutrition service delivery [3], evidence of its effectiveness in Kaduna State remains limited.

Objective: To evaluate the effect of MIYCN training on health worker performance, nutrition service delivery, child nutrition indicators, vitamin A supplementation coverage and selected biochemical indicators among women of reproductive age and children under five years.

Methodology: A quasi-experimental non-equivalent control group design was conducted in selected LGAs of Kaduna State. Respondents: 180 health workers, 360 women of reproductive age (103 for biochemical analyses) and 1,024 children aged 6–59 months. Data collected using questionnaires, observation checklists, facility record reviews, anthropometry and laboratory analyses of haemoglobin, serum ferritin, transferrin, serum zinc, serum retinol and C-reactive protein. Data were analysed using IBM SPSS Version 26 at $P < 0.05$.

Results and Discussion: Table 1: Major Findings

| Indicator | Result | P-value |
|---|---|---|
| **Health worker performance (Intervention)** | 89.76 ± 1.05 | 0.001 |
| **Health worker performance (Comparison)** | 75.58 ± 1.43 | |
| **Vitamin A supplementation coverage** | 89.0% | |
| **Global Acute Malnutrition** | 9.0% | |
| **Stunting** | 25.8% | |
| **Wasting** | 2.4% | |
| **Underweight** | 21.8% | |
| **Haemoglobin (g/dL)** | 11.76 ± 1.05 | |
| **Serum Ferritin (µg/L)** | 75.95 ± 32.14 | |
| **Serum Zinc (µmol/L)** | 13.50 ± 4.62 | |
| **Serum Retinol (µmol/L)** | 1.48 ± 0.43 | |

The significantly higher performance among trained health workers demonstrates the effectiveness of MIYCN training in improving nutrition service delivery, consistent with Bhutta et al. (2020). High vitamin A supplementation coverage (89%) and favourable serum retinol levels suggest effective implementation of micronutrient interventions, supporting WHO (2023). Similarly, the lower prevalence of stunting and wasting compared with the NDHS 2018 estimates may reflect improved nutrition practices and service utilization following MIYCN implementation, although contributions from other health programmes cannot be excluded (NPC & ICF, 2019).

Conclusion: MIYCN training improved health worker performance and was associated with favourable nutrition and micronutrient outcomes. Continued supportive supervision, refresher training and routine nutrition surveillance are recommended.

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**Theme/Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages.

**Title:** Assessment of Knowledge, Skills and Perception of Frontline Workers toward the implementation of Micronutrient Powder (MNP) in Adamawa and Kano States, Nigeria.

Name of Authors (s): *Panda, A.N.[1,2], Abubakar, S.M.[2,] Aliyu, A.A.[3] Shehu, A.[2]

**Affiliation of Author (s):**[1]Department of Nutrition and Dietetics, Federal College of Agricultural Produce Technology Kano, Nigeria

[2]Nutrition Unit, Department of Biochemistry and Africa Center of Excellence for Population Health and Policy, Bayero University Kano, Nigeria

[3]Institute for Agricultural Resarch/Ahmadu Bello University Zaria.

*Corresponding author, e-mail: [najpanda2013@gmail.com], +2348104057513

**Keywords**: Frontline Worker, Micronutrient Powder, Self-efficacy, Stockouts.

**Highlights:**

- Frontline health workers show high self-efficacy (84.5 % - 100 %) in MNP delivery.
- Frequent MNP stockouts limited program success, but counselling practice remains robust.

**BACKGROUND AND OBJECTIVES:**

Micronutrient deficiencies, mainly anemia, remain a major public health problem in Northern Nigeria, affecting approximately 73% of children in the Northwestern region [1]. While Micronutrient Powder is a cost-effective intervention, it has been shown to reduce the risk of iron deficiency anemia.[2]. Its success depends on the capacity of frontline workers. This study aimed to assess the knowledge, skills, and perceptions of frontline workers to identify barriers and enablers to MNP implementation in Adamawa and Kano States.

**MATERIALS AND METHOD:**

A mixed-method approach was adopted for this study. Quantitative data were collected via survey questionnaires from frontline health workers across health facilities in both state (n = 212 per state; total *N* = 423*)*. Qualitative insights were gathered through Key Informant Interview (KII) with stakeholders. Quantitative data were analyzed for significant difference ($p < 0.05$), while qualitative interviews were coded and analysed following transcription of audio-recordings.

**RESULTS AND DISCUSSION:**

The result revealed that, frontline health workers possess high technical knowledge; 94.12 % in Adamawa and 92.06 % in Kano properly identified as one sachet per day (Table 1). Training coverage was particularly higher in Kano (75.23 %) compared to Adamawa (54.11 %, $p = 0.000$), contributing to 100 % self-efficacy in delivery MNP among Kano workers. Robust counselling on usage and importance was observed across both states (90.83 % in Adamawa and 95.77 % in Kano, $p = 0.188$) demonstrating a positive perception of MNP's benefit. Despite high worker competency, implementation was hindered by chronic logistic failure ($p = 0.000$). Severe stockouts (> 8 times/year) was reported by 20 % of health workers in Adamawa. Qualitative feedback in Kano highlighted a unique socioeconomic barrier, quoting a health worker from

Tarauni "*Some mothers complain that MNP increases the appetite of their children and they don't have money to meet the increased food needs of child so they stop taking the MNP"*. Workplace approval was identified as a key organizational enabler.

**Table 1: p value and percentages on Knowledge, Skills and Perception of MNP**

| Variables | Categories | Adamawa State (%) | Kano State (%) | P value |
|---|---|---|---|---|
| **Number of sachets of MNP children under five are expected to take per day** | 1 | 94.12 | 92.02 | 0.811 |
| | 2 | 2.52 | 2.34 | |
| | 3 | 2.52 | 4.67 | |
| | 4 | 0.84 | 0.93 | |
| **Training received related to MNP** | Yes | 54.11 | 75.23 | *0.000 |
| | No | 45.89 | 24.77 | |
| **Self-efficacy in delivering MNP** | Yes | 84.54 | 100.00 | *0.000 |
| | Possibly | 10.14 | 0.00 | |
| | No | 5.31 | 0.00 | |
| **Counselling of mothers about MNP** | Yes, all of the time | 90.83 | 95.77 | 0.188 |
| | Yes, most of the time | 8.33 | 3.76 | |
| | Yes, a few times | 0.83 | 0.47 | |
| **MNP stockouts in the last 12 months** | 0 | 42.50 | 33.18 | *0.000 |
| | 1 – 4 | 25.83 | 64.95 | |
| | 5 – 8 | 11.67 | 0.94 | |
| | >8 | 20.00 | 0.93 | |

*** Significant at p<0.05 (chi-square test)**

## CONCLUSION AND RECOMMENDATION (S):

Frontline health workers in both states possess the essential knowledge and skills to deliver MNP interventions efficiently. However, their capacity is nullified by logistic failures, particularly in Adamawa. It is recommended that policy should prioritizes an overhaul of the supply chain to eradicate stockouts.

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**Theme/sub-theme**: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Assessment of Maternal Socioeconomic Status and Anthropometric Indicators of Under-Five Children attending selected Primary Health Centres in Ogbomoso North, Oyo State, Nigeria.

**Name of Author (s):** *Deniran, I.A.[1], Akinremi T.I.[1], Kolapo M.A.[1], Akorede K.W.[1] and Akanni O.H[1]

**Affiliation of Author (s):** [1]Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.

*Corresponding Author, email: adelyemmy196@gmail.com +2348066361917

**Keywords:** Under-five children, Malnutrition, Socioeconomic Status

**Highlights:**

- Socioeconomic status significantly influenced the nutritional status of children.
- Both undernutrition and overnutrition were prevalent among under-five children.
- Targeted nutrition interventions and further research are needed to address malnutrition.

## BACKGROUND AND OBJECTİVES

Malnutrition continues to be a major public health challenge among under-five children in low and middle-income countries such as Nigeria, where it contributes significantly to increased morbidity, mortality, poor growth and development [1]. This study assessed the association between maternal socioeconomic status and the nutritional status of under-five children at selected Primary Health Centres in Ogbomoso North, Oyo State, Nigeria.

## MATERIALS AND METHOD

This descriptive cross-sectional study recruited 294 consenting mothers using multistage sampling, comprising purposive selection of health centres and proportionate stratified random sampling. Data were obtained using a semi-structured questionnaire and child anthropometry, and analysed using descriptive statistics and chi-square tests at $p < 0.05$.

## RESULTS AND DISCUSSION

The anthropometric indicators are presented in Figure 1. Overall, 8.8% of the children were wasted, 32.0% were stunted, and 37.8% were overweight/obese. This result is similar to previous study which showed that 6.7%, 32.6% and 21.4% were wasted, stunted and overweight respectively. [1]. The association between the Socioeconomic status and the anthropometric indices were presented in Table 1. There was a significant association between socioeconomic status and wasting status of the children (p=0.048). Children from the high socioeconomic status had a higher prevalence of wasting (13.2%) compared to those from medium socioeconomic status (6.4%). The unexpected higher prevalence of wasting among children from high socioeconomic households in this study may suggest the influence of other factors such as feeding practices, illness patterns, or care practices.

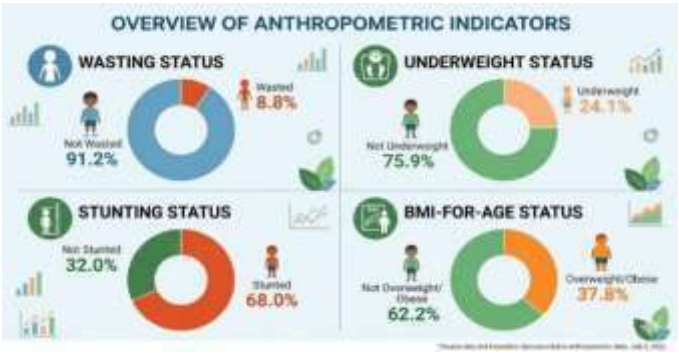



**Fig. 1 Anthropometric indicators of Under-five Children**

**Table 1: Association between Maternal Socioeconomic status and Anthropometric Indicators of the Under-five Children**

| Variable | Category | Wasted n (%) | P | Underweight n (%) | p | Stunted n (%) | p | Overweight/ obese n (%) | p |
|---|---|---|---|---|---|---|---|---|---|
| Socioeconomic status | High SES | 14 (13.2) | .048 | 26 (24.5) | .909 | 65 (61.3) | .064 | 35 (33.0) | .208 |
| | Medium SES | 12 (6.4) | | 45 (23.9) | | 135 (71.8) | | 76 (40.4) | |

Values are presented as n (% within each category). SES = socioeconomic status. Values of $p < .05$ indicate statistical significance.

## CONCLUSION AND RECOMMENDATİON:

The study revealed the presence of both undernutrition and overnutrition among under-five children, emphasizing the need for targeted nutrition interventions. Further research to explore other underlying factors influencing the nutritional status of children in the study area is important.

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**SUB THEME : MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

# TITLE: ASSESSMENT OF MOTHER'S KNOWLEDGE AND PRACTICE ON INFANT FEEDING AND COMPLEMENTARY FOODS AT DAWAKIN TOFA GENERAL HOSPITAL, KANO STATE.

***Sadi, N. S. [1],** Khadijah, A. I. [2], Umar, A. M.[3]
[1]Department of Biochemistry, Bayero University Kano
[2]Nutrition and Dietetics Unit, Bayero University Kano
[3]Yusuf Maitama Sule, Federal Unversity of Education Kano
*dr.nas2020@gmail.com/nssadi.bch@buk.edu.ng/+2348145229645

Key Words: Infant, Feeding, Knowledge, Weaning

Highlights

- Findings revealed that majority of the mothers have an idea on infant feeding and weaning

## Background and Objectives

Infant and young child feeding is critical for child health and survival; it is recommended that infants should be exclusively breastfed for the first 6 months of life and there after receive adequate complementary foods in addition to continued breastfeeding until 2 years of age or beyond [1]. This study assessed the mother's knowledge and practice on infant feeding and complementary foods at Dawakin Tofa General Hospital, Kano State and evaluates the common challenges mothers face in following recommended infant feeding and weaning.

## Materials and Method

A cross-sectional study was conducted among 500 mothers at General Hospital Dawakin Tofa, Kano State. A structured questionnaire was used to assess the knowledge and practices. IBM SPSS Statistics version 25.0 (2017) was used for data analysis.

## Results and Discussion

The findings revealed that majority of the mothers have idea on infant feeding and weaning which is highly attributed to the awareness campaigns and health education sessions; but they possessed poor practice 329 (70.0%) of the mothers strongly agreed that cultural beliefs and practices are the major challenges. These findings highlights the practice gap and the need for Community-based practical support among mothers.

## Conclusion and Recommendation (s)

This study assessed the mother's knowledge and practice on infant feeding and weaning at Dawakin Tofa General Hospital, Kano State. The findings revealed that mothers attending immunization unit at General Hospital, Dawakin Tofa, had high knowledge of recommended infant feeding and weaning practices. Awareness campaigns, health education sessions, and exposure to healthcare advice have contributed to this positive outcome. However, despite this knowledge, actual practices particularly early initiation of breastfeeding, exclusive breastfeeding for six months, and timely complementary feeding were suboptimal, highlighting a persistent knowledge-practice gap. These findings highlight the need for community-based and practical support measures, such as breastfeeding support groups, targeted education for family influencers, and policies that facilitate maternal participation in infant feeding, to bridge the gap between knowledge and practice.

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**Theme**: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title**: Assessment of Micronutrient Deficiencies among Women of Reproductive age in Selected Urban and Rural Areas of Birnin Kebbi LGA, Nigeria

**Name of Author(s)**: *Yusuf, A.B. and Saleh, H.
*Corresponding author, e-mail: yusuf.abdulrahman@fubk.edu.ng, +2348160240925

**Affiliation of Author(s)**: Department of Biochemistry and Molecular Biology, Federal University Birnin Kebbi, Kebbi State, Nigeria

**Keywords**: Micronutrient deficiencies, women of reproductive age, iron deficiency, dietary diversity

**Highlights**:

Iron deficiency is prevalent in both urban and rural women in Birnin Kebbi Metropolis

Urban women have higher dietary diversity score

**Background and Objectives**:

Micronutrient deficiencies, particularly iron, zinc, and calcium, pose significant risks to maternal and child health, affecting over 2 billion people globally, with 38% of pregnant women experiencing iron deficiency anaemia [1]. In Nigeria, low dietary diversity and socio-economic barriers exacerbate these deficiencies [2].

**Materials and Method**:

A cross-sectional study was conducted in three urban (Gwadangaji, Takalau, Badariya) and three rural (Zauro, Ambursa, Maurida) communities of Birnin Kebbi LGA, involving 120 pregnant women (60 urban, 60 rural) selected via simple random sampling. Data were collected using structured questionnaires. Biochemical analyses of blood samples were assessed using Atomic Absorption Spectrophotometry (AAS), vitamin A via spectrophotometry, and total protein using Lowry's method. Data were analysed using Excel (version 2002), with chi-square tests for associations ($p < 0.05$).

**Results and Discussion**: Iron deficiency is prevalent in both groups (urban: 4.59 ± 0.91 µmol/L; rural: 3.43 ± 0.51 µmol/L). Zinc deficiency was widespread (urban: 4.18 ± 0.39 µmol/L; rural: 4.08 ± 0.43 µmol/L). Calcium levels were low (urban: 1.04 ± 0.21 mmol/L; rural: 1.11 ± 0.24 mmol/L). Vitamin A levels were adequate (urban: 1.49 ± 0.15 µmol/L; rural: 1.43 ± 0.17 µmol/L compared to normal: >1.05 µmol/L), likely due to supplementation programs [3]. Iron deficiency was associated with low education, consistent with findings linking socio-economic factors to nutritional status [4].

**Table 1: Average Micronutrients levels of the Participants in Selected Urban and Rural Areas**

| Group | Iron (umol/L) | Zinc (umol/L) | Calcium (mmol/L) | Vitamin A (umol/L) |
|---|---|---|---|---|
| Urban | 4.59 ± 0.91 | 4.18 ± 0.39 | 1.04 ± 0.21 | 1.49 ± 0.15 |
| Rural | 3.43 ± 0.51 | 4.08 ± 0.43 | 1.11 ± 0.24 | 1.43 ± 0.17 |

Values are mean ± standard deviation across all groups for micronutrients

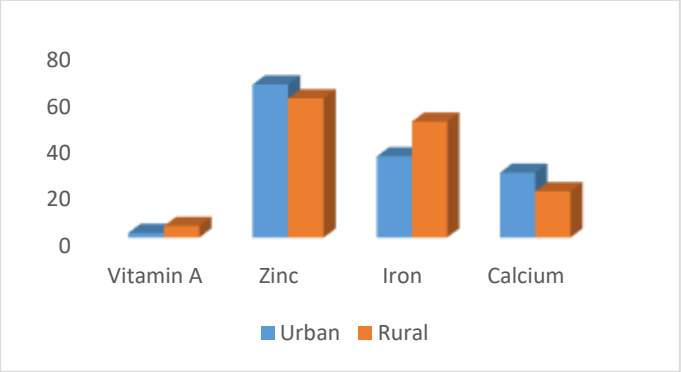



**Figure 1.** Prevalence of Micronutrients deficiency by percentage in 3 urban and 3 rural areas of the study

**Conclusion and Recommendation(s)**:

The study highlights significant micronutrient deficiencies among women of reproductive age in Birnin Kebbi LGA, with rural women facing higher iron deficiency and urban women showing elevated calcium deficiency. Interventions should include iron and calcium supplementation, nutrition education, and promotion of dietary diversity through community gardening and biofortification.

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**Sub-theme:** Innovation in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title:** Development and Validation of Nutrition Education Tools on Dietary Management of Osteoporosis among Elderly.

**Name of Author (s):** *Ozibe G.T. [1], Abdulsalami A.O. [1], and Samuel J.O. [1]

**Affiliation of Author (s):** [1]Department of Dietetics, University College Hospital, Ibadan, Oyo State, Nigeria.

Corresponding author email: giftozibe@gmail.com, +2348132868352

**Keywords:** Osteoporosis, Elderly, Nutrition Education, Dietary Management

**Highlights**

- Nutrition education tools for osteoporosis management were successfully developed and validated
- Over 90% expert agreement on suitability, clarity, and usability of the materials

## BACKGROUND AND OBJECTIVES:

Osteoporosis is a major public health concern among the elderly, characterized by reduced bone mass and increased risk of fractures [1]. Adequate intake of calcium, vitamin D, and adoption of healthy dietary practices are essential for its prevention and management [2]. However, studies in Nigeria have reported low awareness and poor preventive practices among older adults, alongside limited availability of culturally appropriate nutrition education materials [1]. This study aimed to develop and validate nutrition education tools for the dietary management of osteoporosis among the elderly.

## MATERIALS AND METHOD:

A formative research design was adopted for this study. Nutrition education tools, including a flipchart and a trifold pamphlet, were developed based on existing literature, dietary guidelines, and expert recommendations. Content validity was assessed by a panel of registered dietitians using a structured questionnaire evaluating relevance, clarity, accuracy, and appropriateness [3]. Face validity and usability were also evaluated by experts. Data were analysed using descriptive statistics and content validity indices, including item-level content validity index (I-CVI) and scale-level content validity index (S-CVI) [4].

## RESULT AND DISCUSSION:

The study showed that the developed osteoporosis nutrition education tools had high content validity across all domains. Most experts rated the content as highly relevant (88.2%), very clear (82.4%), very accurate (70.6%), and highly appropriate (76.5%), with no negative ratings recorded.

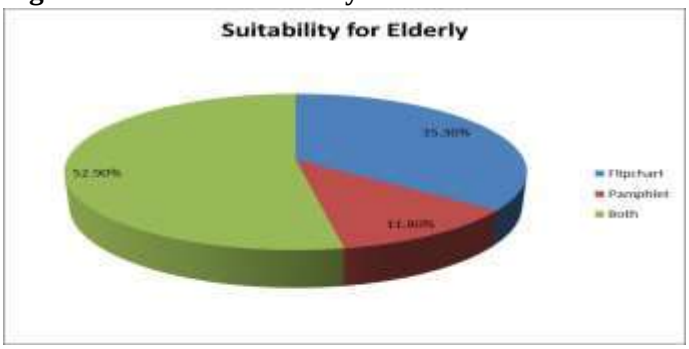
All items met acceptable validity thresholds, with most achieving perfect I-CVI scores (1.00). As shown in Table 1, The scale-level indices were also high: relevance (0.99), clarity (0.96), accuracy (0.93), and appropriateness (0.96).

Face validity findings indicated strong acceptance, with 94.1% agreeing the materials were relevant and 100% confirming suitability for the target audience. As shown in figure 1 over half (52.9%) preferred both the flipchart and pamphlet, while others preferred either the flipchart (35.3%) or pamphlet (11.8%). Overall, the tools were considered appropriate and effective for osteoporosis nutrition education among the elderly.

**Table 1: Result of the Scale-Level Content Validity Index**

| Content | S-CVI |
|---|---|
| **Relevance** | 0.99 |
| **Clarity** | 0.96 |
| **Accuracy** | 0.93 |
| **Appropriateness** | 0.96 |

**Figure 1: Suitability of Tools for Elderly**




## CONCLUSION AND RECOMMENDATION

It was concluded that the developed flipchart and trifold pamphlet for osteoporosis nutrition education among the elderly showed high content validity and strong face validity, indicating that the materials are appropriate, acceptable, and suitable for use. It is recommended that the tools be adopted in hospitals and community health settings for nutrition education on osteoporosis among the elderly.

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**Theme/Sub-theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, and Sectors / MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Maternal Depression and Responsive Feeding Practices among Mothers of Infants Attending Primary Health Care Centres in Ibadan North-West, Nigeria

**Name of Authors:** Samuel J.O and *Awoleye, C. Y.

**Affiliation of Authors***: Department of Dietetics, University College Hospital, Ibadan, Oyo State, Nigeria*

***Corresponding Author, e-mail: catherineawoleye25@gmail.com, +2348100514608**

**Keywords:** Maternal Stress; maternal depression; responsive feeding; infant and young child feeding.

**Highlights**

- Less than one-quarter of mothers practiced responsive feeding.
- Most of the mothers reported moderate perceived stress; however, stress level was not significantly related to responsive feeding.
- More than two-third of mothers were assessed to be depressed. Mothers with depression had 58.1% lower odds of practising responsive feeding than mothers without depression.

***Background and Objectives***: Responsive feeding, defined by timely and appropriate responses to infant hunger and satiety cues, is a core component of infant and young child feeding. Maternal stress and depression may reduce emotional availability and sensitivity during feeding. However, evidence from routine primary health-care centers in Nigeria remains limited. This study assessed the influence of maternal stress and depression on responsive feeding practices among mothers of infants aged 0-24 months attending selected primary health-care centres in Ibadan North-West Local Government Area, Oyo State.

***Methodology*:** A hospital-based cross-sectional study was conducted among 189 mothers attending selected primary health care centres. Participants were selected through multistage sampling, with proportional allocation by clinic attendance and systematic sampling of eligible mothers. Maternal stress, depression and responsive feeding were assessed using the Perceived Stress Scale (PSS), Edinburgh Postnatal Depression Scale (EPDS) and adapted Responsive Feeding Questionnaire, respectively. Data were analysed with SPSS version 27 using descriptive statistics, chi-square tests and binary logistic regression. The regression model was adjusted for maternal age, education and parity. Ethical approval was obtained from the Oyo State Ministry of Health Ethical Review Committee (NHREC/OYOSHRIEC/10/11/22).

**Results and Discussion**: A total of 189 completed questionnaires were analyzed. Majority of the mothers reported moderate perceived stress (88.9%), while 37.6% were assessed to be depressed. Only 23.3% practised responsive feeding, whereas 76.7% practised non-responsive feeding. Maternal stress was not associated with responsive feeding ($\chi^2$=3.570; p=0.168). In contrast, maternal depression was associated with feeding practice ($\chi^2$=3.861; p=0.049). After adjustment for maternal age, education and parity, mothers with depression had lower odds of practising responsive feeding than mothers without depression (aOR=0.419; 95% confidence interval: 0.180-0.976; p=0.044). The predominance of non-responsive feeding despite frequent maternal recognition of hunger cues, indicates that counselling should address not only what infants are fed but also how caregivers interpret refusal, fullness and distress during feeding. This finding is similar to previous studies which reported that maternal depression reduces emotional availability

and responsiveness during feeding interactions, thereby increasing the likelihood of non-responsive feeding behaviours [1,2,3].

**Conclusion and Recommendation:** Maternal depression negatively influence the practice of responsive feeding in this population. Primary health-care MIYCN services should combine practical responsive-feeding counselling with routine maternal depression screening, basic psychosocial support and clear referral pathways. Future studies should examine whether integrated nutrition and maternal mental-health interventions improve feeding interactions and infant dietary outcomes.

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**Sub-theme:** MIYCN as a veritable framework for delivering Nutrition-sensitive and specific interventions across life stages

**Title:** Impact of Maternal, Infant and Young Child Nutrition (MIYCN) Training on Health Worker Performance, Maternal Dietary Intake, and Nutritional Status in Kaduna State, Nigeria

*Aliyu S.T.[1], Mbochi A.L.C.[2], Muhammad-Idris Z.K.[3], Dakare M.[4], Musa R.H.[5], Shanu A.L.[2], Agboola F.O.[2], Hajara J.U.[1], Fademowo S.[1]

1 Department of Nutrition and Dietetics, College of Sciences and Technology, Kaduna Polytechnic, Kaduna, Nigeria.

2 Department of Nutrition and Dietetics, School of Environmental Health Sciences, Shehu Idris College of Health Sciences and Technology, Makarfi, Kaduna State, Nigeria.

3 Department of Community Medicine, Faculty of Clinical Sciences, College of Medicine, Kaduna State University, Kaduna, Nigeria.

4 Department of Biochemistry, Faculty of Life Sciences, College of Science, Computing and Engineering, Kaduna State University, Kaduna, Nigeria.

5 Department of Nutrition, Kaduna State Primary Health Care Board, Kaduna, Nigeria.

*Corresponding author: e-mail: safiyaatnutrition@gmail.com; +2348037033026

**Keywords:** MIYCN; maternal nutrition; dietary intake; nutritional status

**Highlights**

• MIYCN-trained health workers demonstrated significantly higher performance.

• Maternal dietary intakes of key nutrients were significantly improved.

• Anaemia prevalence was lower in intervention communities.

**BACKGROUND AND OBJECTIVES:**

Maternal malnutrition remains a major public health problem in Nigeria and contributes significantly to maternal morbidity, adverse pregnancy outcomes, low birth weight, neonatal mortality and childhood undernutrition. Improving the capacity of frontline health workers through Maternal, Infant and Young Child Nutrition (MIYCN) training is a key strategy for strengthening the quality of nutrition services delivered during antenatal care and improving maternal nutrition outcomes [1,2]. Although Kaduna State has implemented competency-based MIYCN training in selected primary healthcare facilities, evidence on its effectiveness under routine programme implementation is limited. This study evaluated the impact of MIYCN training on health worker performance, maternal dietary intake and nutritional status among pregnant women attending primary healthcare facilities in Kaduna State.

**MATERIALS AND METHODS:**

A quasi-experimental, non-equivalent control group design was conducted among 180 frontline health workers and 360 pregnant women attending selected primary healthcare facilities in intervention and comparison LGAs of Kaduna State. A multistage sampling technique was used to select study participants. Data were collected using structured questionnaires, observation checklists, anthropometric measurements, haemoglobin assessment and 24-hour dietary recall. Nutrient intake was estimated using the Nigerian Food

Composition Table. Health worker performance was assessed using standardized competency indicators. Data were analysed using IBM SPSS Statistics version 26. Descriptive and inferential statistics were used where appropriate. Statistical significance was set at $P < 0.05$.

**RESULTS AND DISCUSSION:**

Health worker performance was significantly higher among trained workers than in the comparison group ($89.76 \pm 1.05$ versus $75.58 \pm 1.43$; $P = 0.001$). Pregnant women who received services from MIYCN-trained health workers had higher mean body mass index, mid-upper arm circumference, gestational weight gain and haemoglobin concentration. They also had significantly higher mean intakes of energy, protein, iron, folate, vitamin A, vitamin C and zinc than women attending comparison facilities ($P < 0.05$). The overall prevalence of anaemia was 63.6%, while anaemia prevalence in intervention communities was 25.5% ($P < 0.05$). These findings suggest that strengthening frontline health worker capacity through MIYCN training enhances nutrition counselling, promotes improved dietary practices and contributes to better maternal nutritional outcomes. The findings are consistent with previous reports that competency-based nutrition interventions can improve maternal nutrition practices and pregnancy outcomes [1,3].

**Table 1. Comparison of Health Worker Performance, Maternal Nutritional Status and Dietary Intake Following MIYCN Training in Kaduna State, Nigeria**

| Variable | Result | P-value |
|---|---|---|
| Health worker performance (Intervention) | 89.76 ± 1.05 | 0.001 |
| Health worker performance (Comparison) | 75.58 ± 1.43 | — |
| Body Mass Index (kg/m²) | 25.57 ± 2.77 | <0.05 |
| Mid-Upper Arm Circumference (MUAC) (cm) | 25.23 ± 1.83 | <0.05 |
| Gestational weight gain (kg) | 9.69 ± 3.15 | <0.05 |
| Haemoglobin (g/dL) | 11.76 ± 1.05 | <0.05 |
| Overall anaemia prevalence (%) | 63.6 | — |
| Anaemia prevalence in intervention communities (%) | 25.5 | <0.05 |
| Energy intake (kcal/day) | 2604.92 ± 292.32 | <0.05 |
| Protein intake (g/day) | 74.73 ± 11.20 | <0.05 |
| Iron intake (mg/day) | 29.89 ± 12.23 | <0.05 |
| Folate (µg/day) | 649.95 ± 58.87 | <0.05 |
| Vitamin A (µg RAE/day) | 817.79 ± 82.64 | <0.05 |
| Vitamin C (mg/day) | 84.20 ± 10.29 | <0.05 |

| | | |
|---|---|---|
| Zinc (mg/day) | 12.71 ± 1.26 | <0.05 |

*Values are expressed as Mean ± Standard Deviation (SD) unless otherwise indicated. Statistical significance was set at $P < 0.05$.*

## CONCLUSION AND RECOMMENDATIONS:

MIYCN training significantly improved frontline health worker performance and was associated with better maternal dietary intake, improved nutritional status and lower anaemia prevalence among pregnant women attending primary healthcare facilities. Institutionalizing regular refresher training, supportive supervision and continuous monitoring of MIYCN implementation is recommended to strengthen maternal nutrition service delivery and improve maternal and neonatal health outcomes.

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**Theme/sub-theme:** DELIVERING BETTER NUTRITION FOR ALL: Connecting The Dots Across Life Cycle, Systems, & Sectors/ MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Double Burden of Malnutrition among School-aged Children in Southwest Nigeria: State-level Variations and Associated Factors Using the Modified Composite Index of Anthropometric Failure (mCIAF)

**Name of Authors:** Wahab, N.O. [1], Sanusi, R.A. [2], Akerele, R.A. [1], Ariyo, O. [2], Eyinla, E.T. [2] Bakare, H.A[3]. Olusanya, J.O[1], Odunsina, O.A[4].

**Affiliation of Authors:**
[1]Department of Home Economics and Hotel Management, Tai Solarin Federal University.

[2]Department of Human Nutrition and Dietetics, University of Ibadan.

[3]Department of Hospitality and Tourism Federal University of Agriculture, Abeokuta. [4]Department of Agricultural Economics, Tai Solarin Federal University of Education, Ijebu-Ode

*Corresponding author: email: oppmot@yahoo.com, +2348063997131

**Keywords**: Double Burden of Malnutrition (DBM), State-level variations, Modified Composite Index of Anthropometric Failure (mCIAF), School-aged Children

**Highlights**

- Double Burden of Malnutrition was measured using Composite Index of Anthropometric Failure (mCIAF)
- Malnutrition among respondents was underestimated by conventional anthropometric measures, while mCIAF more correctly captures the prevalence of malnutrition.

**BACKGROUND AND OBJECTIVES**
The conventional method of assessing malnutrition fails to capture children who suffer from multiple forms of failure simultaneously. Meanwhile, CIAF provide a single, comprehensive measure. This study thus assessed double burden of malnutrition among school-aged children in Southwest Nigeria using mCIAF.

**MATERIALS AND METHOD**
This cross-sectional study purposively selected Lagos, Oyo, and Ogun (using multi-stage), recruiting 4,192 SAC. Data was gathered using a validated, semi- structured, interviewer-administered questionnaire. Anthropometric measurement were taken using standard procedures to determine the prevalence of stunting, thinness, underweight, overweight/obesity and mCIAF. mCIAF presence means any failure, indicating the double burden of malnutrition. Anthropometric measurements were analysed using WHO-anthroplus. Descriptive statistics were used to obtain the prevalence of each mCIAF category Chi-square test and logistic regression analyses were conducted. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were estimated to identify factors associated with DBM.

**RESULTS AND DISCUSSION**
Prevalence of stunting, underweight, thinness, overweight/obesity and anthropometric failure (distribution of mCIAF categories) were: 18.8%, 23.6%, 16.0%, 1.5% and 52.6%, respectively. This is not consistent with the study of Zailani *et al*., 2020 [1], conducted among school-aged children in Zaria, Kano State (stunting, wasting, underweight and anthropometric failure; 22.1%, 9.1%, 18.5%, respectively). Identified factors responsible for mCIAF were: age, sex, household size, locations, mothers' education and wealth

quintile. Children aged 10-11 years have nearly 7 times higher odds of experiencing anthropometric failure compared to children aged 6-7 years.

## CONCLUSION AND RECOMMENDATION

Conventional anthropometric indices underestimated respondents' malnutrition, but mCIAF more accurately reflects its current prevalence among school-age children, and significant inter-state variations necessitate state-specific interventions.

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Nutritional Status and Composite Index of Anthropometric Failure among the School-Aged Children Enrolled on National Homegrown School Feeding Programme in Zaria LGA. Nutrition Society of Nigeria (nsn) 50th annual general meeting and scientific conference, 2020

Theme and Sub-theme: MIYCN as a veritable framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages

Title: **Creating an Enabling Environment for Optimal Breastfeeding among Teenage Mothers in Low- and Middle-Income Countries: A Narrative Review**

Name of Authors: Oyebanji Opemipo Joy[l]* andOluwaseun Ariyo[l]
Affiliation of Authors: [l]Department of Human Nutrition & Dietetics, University of Ibadan, Ibadan
*Corresponding Author Email & Phone No.: ooyebanji550@stu.ui.edu.ng; +2347039719317
Keywords: Breastfeeding practice, Adolescent motherhood, socio-ecological model

**Highlights**

1. An enabling environment for optimal breastfeeding must be constructed simultaneously across all levels of the socio-ecological model, from the individual adolescent to households, communities, health services, and policy.
2. Grandmother- and partner-inclusive counselling is the most consistently effective family-level lever, more than doubling exclusive breastfeeding rates in adolescent-specific trials.

**BACKGROUND AND OBJECTIVES:** Women of Reproductive age (15-49 years) are routinely treated as a single programmatic category, despite profound heterogeneity in physiological and nutritional needs, socioeconomic and power dynamics. Adolescent mothers (≤19 years) are the most vulnerable group following ongoing growth and development, limited experience with infant care, little autonomy and heightened stigma. This review examines teenage mothers' breastfeeding experiences in LMICs, organises the determinants using the socio-ecological model (SEM), identifies what an enabling environment requires, reviews interventions tested so far, and defines the key research gaps for adolescent-responsive policy and practice.

**MATERIALS AND METHODS:** A review was conducted of peer-reviewed studies and relevant grey literature published in English between January 2016 and May 2026. Six databases were searched, PubMed/MEDLINE, Scopus, Web of Science, and regional platforms, including African Journals Online (AJOL), complemented by hand-searching of reference lists. Search terms combined the concepts of adolescent/teenage mother, breastfeeding/exclusive breastfeeding/infant feeding, barriers/enablers/support, and low- and middle-income countries. Eligible records reported empirical breastfeeding experiences, enablers or barriers among mothers aged ≤19 years in LMIC settings, and included qualitative (phenomenological), cross-sectional and randomised controlled trial (RCT) designs. Study selection followed a PRISMA-informed process and findings were synthesised thematically against the levels of the socio-ecological model.

**RESULTS AND DISCUSSION**: Across the 25 studies, determinants of breastfeeding among teenage mothers clustered at every level of the socio-ecological model (SEM). Knowledge alone was insufficient as a persistent knowledge–practice gap was mediated by psychological, relational, economic and structural forces (Table 1). Three findings recurred. First, early formula introduction and EBF discontinuation were accelerated by psychological trauma, perceived insufficient milk, health-worker stigma and economic labour demands. Second, early cessation was heavily driven by multi-generational household dynamics, with grandmother authority frequently overriding clinical guidance. Third, family-inclusive counselling was the strongest lever including engaging grandmothers raised six-month EBF to around 29% versus about 5% in controls, [2] and mHealth approaches show early promise for improving adolescent IYCF knowledge in Nigeria.[3] These findings reframe adolescent breastfeeding as a systemic rather than an individual challenge.

Because barriers operate simultaneously across the SEM, single-channel education is unlikely to succeed; the consistency of the family-inclusive evidence marks grandmother- and partner-focused counselling as the highest-yield entry point, particularly where household decision-making is intergenerational. Complementary mHealth tools may extend reach among digitally connected young mothers, [3] but the evidence base remains dominated by qualitative and cross-sectional designs, with few adolescent-specific RCTs and scarce Nigerian trials. Priority gaps include multi-centre longitudinal RCTs measuring infant growth rather than knowledge alone, and implementation research on adolescent-responsive, multi-level MIYCN programming in high-burden settings such as Nigeria.

**Table 1: Determinants of breastfeeding among teenage mothers, by SEM level**

| SEM level | Barriers | Enablers / levers |
|---|---|---|
| Individual | Trauma of unplanned pregnancy; perceived insufficient milk; low self-efficacy; pain/embarrassment. | Adolescent-specific counselling building confidence and lactation self-efficacy. |
| Interpersonal | Grandmother authority overriding clinical advice; absent partner support; early prelacteal feeding. | Grandmother- and partner-inclusive counselling; peer support. |
| Community | Cultural myths (colostrum "dirty", milk "insufficient" without water); stigma of adolescent motherhood. | Mother-support groups; positive norms; trusted community advisers. |
| Health system | Stigmatising health-worker attitudes; weak lactation support; few adolescent-friendly services. | Trained, non-judgemental counsellors; home-based follow-up. |
| Structural / policy | Economic and labour demands; weak maternity protection; poverty driving early supplementation. | Maternity protection; MIYCN policy alignment; multi-sectoral programming. |

**CONCLUSION AND RECOMMENDATION(S):** Improving breastfeeding among teenage mothers requires shifting from individual clinical instruction to family-inclusive, multi-sectoral and non-stigmatising support that protects young maternal autonomy. Programmes should embed grandmother- and partner-inclusive counselling, train health workers in adolescent-responsive care, mobilise community and peer support against stigma, and align maternity-protection and MIYCN policy to ease the economic pressures driving early supplementation. Building an enabling environment across every level of the socio-ecological model is the most credible path to closing the adolescent breastfeeding gap and advancing child survival in LMICs.

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**Theme/sub-theme**: MIYCN as a veritable framework for delivering nutrition-sensitive and specific interventions across life stages.

**Title**: Nutritional Status, Micronutrient Supplementation Compliance and Associated Factors among Pregnant Women attending Primary Healthcare Centres in selected LGAs within Southwest Nigeria

**Author (s)**: *Olaogun A. A., Taiwo J. A., Oni O. V., Omiyale L. O., Okoye E. I., Akande C. F.

**Author (s) Affiliation**: Department of Nutrition and Dietetics, Federal University of Agriculture Abeokuta.

*Corresponding author, e-mail address: olaogunaa@funaab.edu.ng, +234809495507

**Keywords:** Nutritional status, Micronutrient supplementation, Pregnant women, Antenatal care

**Highlights**

- Weight, Height and MUAC measurement were used to assess nutritional status
- Age, marital status, household size, educational level and occupation were significantly associated with supplementation compliance
- Almost half of the pregnant women demonstrated high compliance with micronutrient supplementation.

**Background and objective:** Micronutrient deficiencies remain a public health concern among pregnant women in Nigeria, especially in urban and peri- urban communities, increasing risk of maternal anaemia, infections, low birth weight and poor infant development [1]. Multiple Micronutrient Supplements (MMS) are recommended during pregnancy to prevent common nutritional problems including anaemia and impaired fetal growth [2]. This study assessed nutritional status, micronutrient supplementation compliance and associated factors among pregnant women attending primary health care centres in selected Local Government Areas (LGAs) in Southwest Nigeria.

**Methodology:** A descriptive cross-sectional survey of 1,104 pregnant women was conducted in primary health care centres across five Local Government Areas (LGAs) in Ogun, Oyo and Lagos States. Respondents were selected by simple random sampling. Micronutrient supplementation compliance was assessed using standardized Demographic and Health Survey indicators; socio-demographic and obstetric information was collected through an interviewer-administered questionnaire. Weight, Height and MUAC measurements were taken using standard procedures to determine the nutritional status of the respondents. Data were analysed with SPSS version 20 and presented using frequencies, percentages, means and standard deviations; chi-square tested associations at $p<0.05$.

**Results:**

**Socio-demographic characteristics and obstetric information among the respondents**

The majority of the respondents were aged 24-30 years (36.1%), married (91.3), had secondary education (37.3%) and were traders (40.9%). Most (88.9%) registered for antenatal care during the first trimester and 91.8% received nutrition counselling during antenatal visits. **Nutritional status (Anthropometric and Mid Upper Arm Circumference measurements) and compliance score of the respondents**

Mean weight was 66.52kg, mean height was 1.65m and median mid upper arm circumference was 25.4cm. Using MUAC cut-offs of <21cm (severe malnutrition), 21.0-22.9 cm (Moderate Malnutrition) and 23cm and above (Adequate Nutritional Status), 77.3% of the respondents had adequate nutritional status while 13.0% were severely malnourished and 9.7% were moderately malnourished. This is comparable to findings from Niger State where approximately 25% of pregnant women had low MUAC, underscoring persistent maternal undernutrition [3]. High compliance with supplementation was observed in 46.1%, while 36.5% and 17.5% had moderate and low compliance respectively based on 0-2 days (low compliance), 3-5 days (moderate compliance) and 6-7 days (high compliance) of supplementation in the preceding week. The relatively high compliance may reflect the high coverage of nutrition counselling during antenatal care with evidence from a Nigerian and Pakistan study identifying counselling as an important facilitator of adherence, while behavioural and health-system barriers can limit optimal compliance [4] (Figure 1).

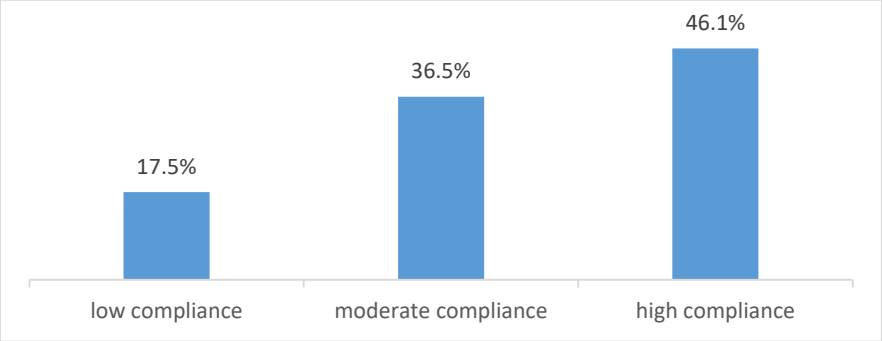



**Figure 1: Multiple Micronutrient Supplementation Compliance among the Respondents.**

**Association between socio-demographic characteristics and compliance level**

Micronutrient supplementation compliance was significantly associated with age (p=0.021), marital status (p=0.002), household size (p =0.002), educational level (p<0.001) and occupation (p<0.001). Other socio-demographic variables like religion (p=0.823) and monthly income (p=0.282) showed no significant associations.

**Conclusion and recommendation**

Most pregnant women had adequate nutritional status and almost half demonstrated high compliance with micronutrient supplementation. Educational level and occupation were significantly associated with compliance. Strengthening antenatal care nutrition education and behaviour change interventions, alongside reminder strategies, management of supplement-related barriers and uninterrupted multiple micronutrient supplements availability, may improve adherence and maternal nutritional outcomes, particularly among women with lower educational attainment.**References**

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**Sub-theme:** MIYCN as a veritable framework to deliver nutrition-sensitive and specific interventions across life stages.

## Influence of Maternal Characteristics on Exclusive Breastfeeding Practices Among Mothers Attending Child Welfare Clinics in Odeda L.G.A., Ogun State, Nigeria

*Tijani, O.N.[1], and Afolabi, W.A.O.[2]

[1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta.

*Corresponding author, e-mail: oluwatoyintijani177@gmail.com

**Keywords:** Exclusive breastfeeding, maternal characteristics, breastfeeding duration, occupational structure

### Highlights

- Knowledge (71.4%) did not predict breastfeeding practice (P=0.484)
- Occupational structure, not knowledge or age, determined exclusive breastfeeding duration (P<0.001)
- Adolescent mothers had the lowest exclusive breastfeeding rates despite similar knowledge

### Background and Objectives

Poor infant and young child feeding practices remain a leading contributor to childhood malnutrition globally. Low practice is often assumed to reflect a knowledge deficit, but evidence suggests maternal age and occupation may independently shape whether mothers act on what they know [1,2]. This study assessed whether breastfeeding knowledge translates into practice, and examined how maternal age and occupation influence exclusive breastfeeding among mothers attending Primary Healthcare Centres (PHC) in Odeda Local Government Area, Ogun State.

### Materials and Method

A descriptive cross-sectional design was adopted among 280 mothers of children aged 6-23 months, presenting mainly for routine immunization at Child Welfare Clinics in five PHC centers in Odeda Local Government Area, selected via multi-stage sampling. A pretested, structured questionnaire was used to assess socio-demographic characteristics, breastfeeding practices, and knowledge of exclusive breastfeeding. Knowledge was assessed using a nine-item section covering first feeds, the meaning and duration of exclusive breastfeeding, feeding frequency, benefits, and strategies for sustaining breastfeeding despite low milk supply or maternal work separation, adapted from the Food and Agriculture Organization Knowledge, Attitude and Practice (FAO-KAP) questionnaire. Each correct response scored one point, with total scores categorized as excellent (7–9), good (4–6), or poor (0–3). Data were analyzed in SPSS v26.0, using Chi-square and Pearson Correlation at P<0.05

### Results and Discussion

The majority of respondents (71.4%) had excellent knowledge grades (7–9), about one-quarter (25.7%) had good grades (4–6), and a small proportion (2.9%) had poor grades (0–3), yet this knowledge showed no significant correlation (r= 0.042; p = 0.484) with actual breastfeeding practice (Table 2). Maternal age was not significantly related to breastfeeding duration (Table 1), although adolescent mothers (10 to 19 years) fared worst, with only 17.6% reaching six months and 35.3% not breastfeeding at all, compared with 51.3%

among mothers aged 20 to 39 years. In line with Odukoya et al. [1] and Shittu et al. [2], this gap may point to reduced decision-making autonomy among younger mothers within the household, though this pathway was not directly examined in the present study.

Occupation, on the other hand, showed a strong association with breastfeeding duration (Table 1), reflecting structural differences rather than a simple employed versus unemployed divide. All casual labourers (100%) breastfed for less than four months, and office workers similarly underperformed (46.7% at six months), despite formal breastfeeding-friendly workplace policies, pointing to a gap between policy adoption and enforcement. Mothers in flexible or informal occupations recorded the highest six-month rate (55.8%); unemployed mothers (48.3%) did not surpass this figure, indicating that the flexibility an occupation genuinely allows, not time availability alone, is the more relevant factor.

These findings position Maternal, Infant, and Young Child Nutrition (MIYCN) as a delivery framework operating across multiple channels rather than one. PHC counselling already builds knowledge effectively, but narrowing the practice gap will likely require nutrition-sensitive support beyond the clinic, such as enforced workplace policy and sustained reinforcement.

**Table 1: Maternal Age, Occupation and Exclusive Breastfeeding Duration (N=280)**

| **Characteristics** | <4 Mo | 4-5 Mo | 6 Mo | >6 Mo | Not at all | $X^2$ | P-value |
|---|---|---|---|---|---|---|---|
| **Maternal Age** | | | | | | 17.766 | 0.123 |
| 10-19 Years | 8(47.1) | 0(0.0) | 3(17.6) | 0(0.0) | 6(35.3) | | |
| 20-39 Years | 42(18.6) | 14(6.2) | 116(51.3) | 8(3.5) | 46(20.4) | | |
| >50 Years | 6(17.1) | 3(8.6) | 22(57.1) | 0(0.0) | 6(17.1) | | |
| **Occupation** | | | | | | 59.911 | 0.000 |
| Casual Labour | 7(100.0) | 0(0.0) | 0(0.0) | 0(0.0) | 0(0.0) | | |
| Business | 15(22.4) | 8(11.9) | 31(46.3) | 6(9.0) | 7(10.4) | | |
| Office work | 5(16.7) | 0(0.0) | 14(46.7) | 0(0.0) | 11(36.7) | | |
| Unemployed | 5(17.2) | 4(13.8) | 14(48.3) | 0(0.0) | 6(20.7) | | |
| Flexible/Informal | 24(16.3) | 5(3.4) | 82(55.8) | 2(1.4) | 34(23.1) | | |

**Table 2: Knowledge of Exclusive Breastfeeding and Breastfeeding Practices (N=280)**

| **Variable** | **R** | **P-value** | **Decision** |
|---|---|---|---|
| Knowledge vs. Breastfeeding practices | 0.042 | 0.484 | Not Significant |

**Conclusion and Recommendation(s)**

Knowledge of exclusive breastfeeding was high but did not translate into practice; occupational structure, more than knowledge or age, determined whether it was sustained. MIYCN programming should pair age-

differentiated counselling with enforced workplace breastfeeding policy and targeted support for casual labour and rigid occupations, converting knowledge into practice across the first 1,000 days.

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**Theme/Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages**

**Title: Assessment of Perception of Cultural Practices in Relation to Nutritional Status of Under-five Children in Akinyele Local Government Area, Ibadan, Oyo State**

**Authors: Akinsanmi, O. A.*[1], and Adepoju, O. T[1].**

**Affiliation of authors:** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo State, Nigeria

***Corresponding author:** akinsanmioyenike771@gmail.com +2349034799716

**Keywords:** Exclusive Breastfeeding, Dietary Diversity, Malnutrition, Complementary Feeding

**Highlights**

- Most (90.8%) of the participants were reportedly aware of exclusive breastfeeding.
- Only 39.8% confirmed their children were exclusively breastfed
- Majority of the mothers took care of their children based on instructions from the elders, not what the healthcare professionals instructed.

**BACKGROUND AND OBJECTIVES:** Nutrition is an important part of a child's growth and development, especially in the first two years of life considered as the window of opportunity when child well-being can be improved [1]. In developing countries, growth faltering occurs as a result of inadequate food intake, children being the most susceptible [2]. Cultural beliefs, customs, norms, and traditions of a particular community may affect the ideal practice of recommended adequate nutrition for children under five. In Nigeria, recent data from the 2023–24 Nigeria Demographic and Health Survey showed that 29% of children under five are stunted, 18% are underweight, and 6.5% are wasted, while 2% are overweight [3]. This study was carried out to assess the perception of cultural practices related to the nutritional status of under-five children in Akinyele Local Government Area, Ibadan.

**METHODS**: The study adopted a mixed-method research design in Akinyele Local Government Area, integrating both quantitative and qualitative approaches. A four-stage multi-stage random sampling technique was employed to select six wards comprising 422 mothers/caregivers and their under-five children. Data collection involved a pre-tested, semi-structured interviewer-administered questionnaire to obtain information from respondents. Anthropometric measurements (weight and height) were taken to assess the nutritional status of the children, classified as wasting, stunting, and underweight, using WHO Anthro software version 3.2.2. Dietary diversity was evaluated through a 24-hour dietary recall. Data was analysed using descriptive statistics and chi-square test at $p<0.05$.

**RESULTS AND DISCUSSION:** The knowledge of cultural practices as related to nutritional status increased the delayed initiation of breastfeeding, which correlates with increased wasting severity. Breastfeeding initiation timing was significantly associated with all three malnutrition indicators, with the distribution of initiation timing differing markedly between children classified as normal, moderately, and severely malnourished for wasting ($p = 0.026$), stunting ($p = 0.020$), and underweight ($p = 0.009$). Among respondents, 60.0% believed that traditional knowledge or practices are sufficient for meeting children's nutritional needs, 37.4% expressed a belief that nutrition education is unnecessary or irrelevant to children's health, regarding nutrition education as irrelevant and preferred to follow the instructions of community elders over those of healthcare professionals on infant and young child feeding practices.

**Table 1: Nutritional Status Distribution According to Cultural Beliefs and Practice of Mothers/Caregivers (N=422)**

| Category | Normal n (%) | Moderate n (%) | Severe n (%) | p-value |
|---|---|---|---|---|
| **Wasting** | | | | |
| Within 1 hour | 133 (40.3) | 24 (64.9) | 13 (43.3) | |
| 24 hours | 170 (51.5) | 12 (32.4) | 17 (56.7) | 0.026 |
| More than 24 hours | 27 (8.2) | 1 (2.7) | 0 (0.0) | |
| **Stunting** | | | | |
| Within 1 hour | 70 (40.9) | 36 (42.4) | 78 (47.3) | |
| 24 hours | 85 (47.9) | 39 (45.9) | 84 (50.9) | 0.020 |
| More than 24 hours | 16 (9.4) | 10 (11.8) | 3 (1.8) | |
| **Underweight** | | | | |
| Within 1 hour | 114 (43.5) | 36 (42.9) | 35 (46.1) | |
| 24 hours | 121 (46.2) | 46 (54.8) | 41 (53.9) | 0.009 |
| More than 24 hours | 27 (10.3) | 2 (2.4) | 0 (0.0) | |

**Table 2: Caregivers' Beliefs on Cultural Knowledge of Under-five Children Nutritional Needs**

| Variable (N=422) | N (%) |
|---|---|
| Traditional knowledge/practices are sufficient for meeting children's nutritional needs | 253 (60.0) |
| Nutritional education is unnecessary or irrelevant to children's health | 158 (37.4) |
| Belief that traditional remedies or practices are more effective than supplements or fortified foods | 120 (28.3) |
| Belief that certain foods are appropriate for boys or girls | 32 (7.5) |

**CONCLUSION AND RECOMMENDATIONS:** High prevalence of malnutrition was detected among the children in the study area, which have been associated with the mother or caregiver practices because children nourishment depends on the mother or caregiver especially during the first five years of life. Mothers should be sensitized and encouraged to practice exclusive breastfeeding, timely and appropriate complementary feeding. There is need for implementation of community-based interventions that promote positive cultural practices and discourage harmful ones.

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**Theme/sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title:** Improvements in Breastfeeding Practices Have Not Been Matched by Comparable Progress in Complementary Feeding Indicators in Nigeria

**Name of Author(s):** Idowu, O.A.[1]*, Onuorah, U.M.[2]

**Affiliation of Author(s)**:

[1]Dietetics department, Federal Medical Center, Abeokuta, Ogun State, Nigeria.

[2]Department of Pharmacy and Health and Nutrition Sciences, University of Calabria, Italy.

*** Corresponding Author's Details:** busayo2.idowu@gmail.com, 08145666684

**Keywords:** Infant and Young Child Feeding (IYCF), Breastfeeding, Complementary Feeding

**Highlights:**

- Breastfeeding progress was not matched by complementary feeding gains
- Nigeria's infant feeding progress was uneven across the feeding continuum

## BACKGROUND AND OBJECTİVES:

Appropriate infant and young child feeding (IYCF), encompassing both breastfeeding and complementary feeding, is fundamental to child growth and development [1]. Despite decades of national policies and programmes to improve IYCF in Nigeria, suboptimal feeding practices remain a major public health concern. Although previous studies have examined trends in breastfeeding and complementary feeding separately [2], few have examined their progress concurrently. This study therefore aims to compare national trends in breastfeeding and complementary feeding indicators to determine whether progress has been balanced across the infant feeding continuum.

## MATERIALS AND METHOD:

A secondary data analysis was conducted using nationally representative data from the World Health Organisation Global Health Observatory (WHO-GHO). Only data from the 2013 NDHS, 2016–17 MICS, 2018 NDHS, and 2021 MICS were included in this study because they provided comparable estimates for all selected breastfeeding and complementary feeding indicators. Percentage-point changes were calculated between 2013 and 2021, while simple linear regression was used to estimate the annual rate of change (β) and the goodness-of-fit ($R^2$) for each indicator.

## RESULTS AND DISCUSSION:

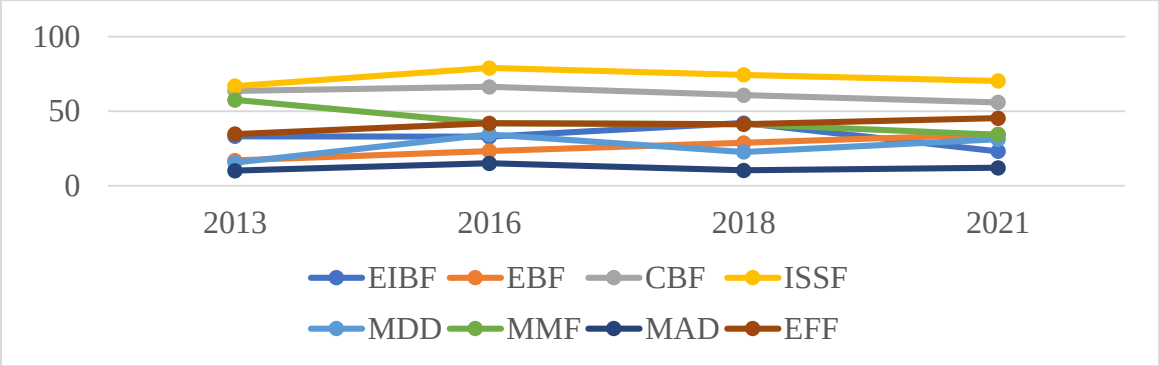
The results, as shown in Table 1 and Figure 1, indicate uneven progress across the infant feeding continuum. While exclusive breastfeeding improved substantially, gains in complementary feeding were inconsistent, particularly for minimum meal frequency and minimum acceptable diet.

**Table 1: Changes in breastfeeding and complementary feeding indicators in Nigeria between 2013 and 2021 and estimated annual rates of change**

| | Indicator | Prevalence in 2013 (%) | Prevalence in 2021 (%) | PP change (%) | β | $R^2$ | Trend |
|---|---|---|---|---|---|---|---|
| **BF** | **Indicators** | | | | | | |
| | EIBF | 33.2 | 23.2 | - 10.0 | - 0.915 | 0.157 | Declining |
| | EBF | 16.9 | 34.4 | 17.5 | 2.218 | 0.996 | Increasing |
| | CBF | 57.9 | 55.9 | - 2.0 | - 1.071 | 0.656 | Declining |
| **CF** | **Indicators** | | | | | | |
| | ISSF | 66.9 | 70.3 | 3.4 | 0.265 | 0.029 | Increase |
| | MDD | 15.5 | 31.1 | 15.6 | 1.488 | 0.345 | Increase |
| | MMF | 57.5 | 34.2 | - 23.3 | - 2.762 | 0.894 | Declining |
| | MAD | 10.1 | 12.0 | 1.9 | 0.085 | 0.016 | Minimal increase |
| | EFF | 34.7 | 45.3 | 10.6 | 1.232 | 0.880 | Strong increase |

BF = Breastfeeding; CF = Complementary feeding; EIBF = Early initiation of breastfeeding; EBF = Exclusive breastfeeding; CBF = Continued breastfeeding (12–23 months); ISSF = Introduction of solid, semi-solid and soft foods; MDD = Minimum dietary diversity; MMF = Minimum meal frequency; MAD = Minimum acceptable diet; EFF = Egg and/or flesh food consumption; PP change = Percentage-point change; β = Estimated annual change in prevalence (percentage points/year); $R^2$ = Coefficient of determination.

**Figure 1. Trends in breastfeeding and complementary feeding indicators in Nigeria, 2013–2021**




## CONCLUSION AND RECOMMENDATION:

Progress in breastfeeding has not been consistently matched by comparable improvements in complementary feeding indicators. National MIYCN programmes should strengthen complementary feeding interventions alongside breastfeeding promotion.

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**SUB-THEME: MIYCN AS A VERITABLE FRAMEWORK FOR DELIVERING NUTRITION-SENSITIVE AND SPECIFIC INTERVENTIONS ACROSS LIFE STAGES**

# TOPIC: DIET QUALITY AMONG WOMEN OF REPRODUCTIVE AGE IN SELECTED URBAN COMMUNITIES IN ABIA STATE, NIGERIA

*Okonkwo E.M[1], Ejoh S.I[2]

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State

[2]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan

**Corresponding author* ***Email:*** *elizabethokonkwo43@gmail.com* ***Phone:*** *+2348061529484*

**KEYWORDS**: Diet quality, Dietary Diversity, Women, Non-communicable Diseases (NCDs)

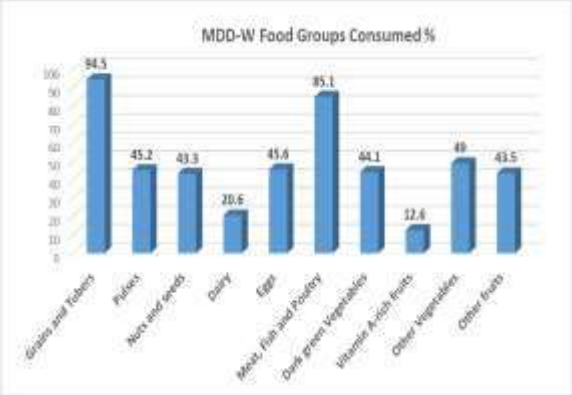
**HIGHLIGHT:**

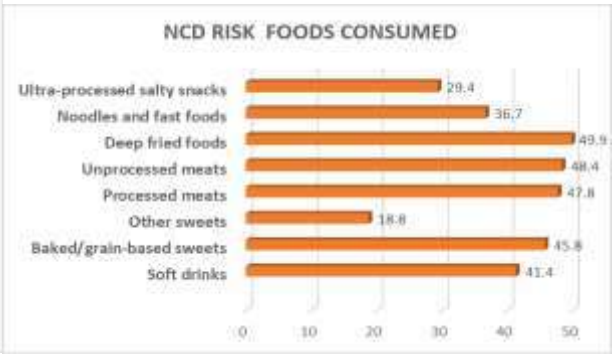
- Limited dietary diversity and poor overall diet quality
- High consumption of NCD-risk foods in the study area
- Poor Global Dietary Recommendations (GDR) Score

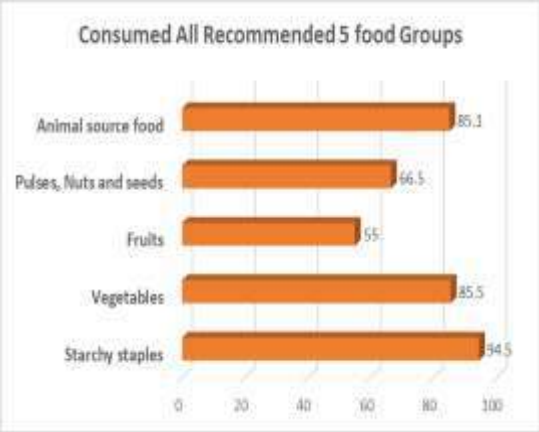
**BACKGROUND AND OBJECTIVES**: Poor diet quality and inadequate dietary diversity remain significant public health concerns in Nigeria, particularly among women of reproductive age (WRA) [1]

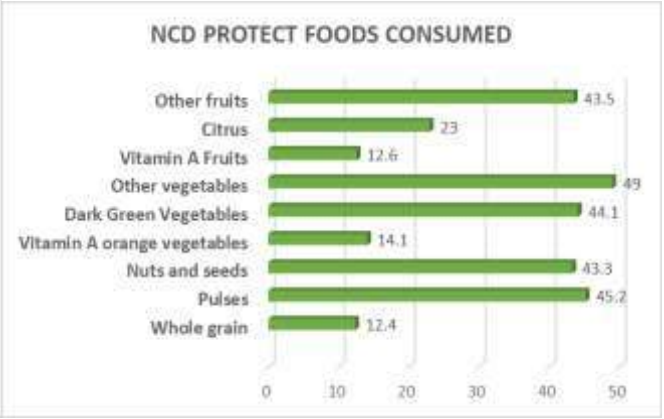
**METHODOLOGY:** The study was a descriptive cross-sectional study conducted among WRA. We selected 469 mothers through a multistage sampling method from 6 selected communities in three urban LGAs of Abia State. Data were collected using a structured questionnaire. Dietary intake was assessed using a 24-hour dietary recall administered through the Nigerian Diet Quality Questionnaire (DQQ) [2]. Dietary diversity was evaluated using the Minimum Dietary Diversity for Women (MDD-W), while diet quality was assessed using food group adequacy, NCD-Protect Score, NCD-Risk Score, and the Global Dietary Recommendations (GDR) Score. Data analysis was performed using STATA version 16.

**Result:** The average age of women was 31.6±9.8 years. More than half (53.9%) of the women were married, and 50% attained tertiary education. The most consumed foods were grains (77%), while 59% consumed tubers and plantains. The least consumed food groups were vitamin A-rich fruits **(**12.6%**)** and Cheese (5.3%)**.** Only 43% of women achieved the MDD, with a mean Dietary Diversity Score (DDS) of 5.29 ± 1.89. Consumption of NCD risk foods was high: deep-fried foods (49.9%), processed meats 48%, Soft drinks (41%), noodles and fast foods (37%). Seven out of ten did not meet all five recommended food groups, while ninety-two per cent recorded low NCD-Protect Scores. The mean Global Dietary Recommendations (GDR) Score was 8.60 ± 2.03.




**Conclusion:** These findings suggest the need for interventions and policies that encourage the consumption of diverse, protective diets to improve diet quality and reduce the growing burden of NCDs among women in Nigeria

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**Theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages

**Title**: Household Iodized Salt Use and Nutritional Status of Women of Reproductive Age and Under-Five Children in Akpabuyo, Nigeria

**Name of Authors:** *EKPO, A. I.[1], Ene-Obong, H. N[2] and Aburime, L.C[2]

**Affiliation of Authors:** [1]Department of Public Health, Faculty of Allied Medical Science University of Calabar.

[2]The Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences, University of Calabar.

Corresponding author: thonisrael@gmail.com/08063534174

**Keywords:** Iodized salt; iodine deficiency, women of reproductive age, under five children.

**Highlight**:

- Maternal-child iodine status correlates heavily, risking intergenerational damage.
- Palpable-visible goiter in children strongly links to a 100% overweight rate.
- High maternal knowledge boosts normal child urinary iodine levels up to 38.9%.

**BACKGROUND AND OBJECTIVES:**

Iodine deficiency disorders remain a public health challenge among vulnerable populations [1]. This study assessed household iodized salt use and iodine nutritional status among women of reproductive age and under-five children in Akpabuyo Local Government Area of Cross River State, Nigeria, focusing on salt consumption patterns, iodine content, urinary iodine concentration, goiter prevalence, nutritional status, and factors influencing iodine nutrition

**MATERIALS AND METHODS:**

A cross-sectional study design was adopted among 333 respondents comprising women of reproductive age (15–49 years) and under-five children selected through multistage sampling. For biochemical assessment, 10% of the study population (33 respondents) were systematically selected for urinary iodine concentration analysis. Data were collected using a semi-structured questionnaire, anthropometric measurements, household salt iodine testing, urinary iodine concentration analysis, and observation of visible goiter. Descriptive and inferential statistical methods were used to analyze the data.

**RESULTS AND DISCUSSION:**

Most households were male-headed (76.6%), with 53.8% of women self-employed and over 60% earning below ₦50,000 monthly. Although iodine-related knowledge (52.5%), attitude (71.2%), and practices (85.3%) were generally good, all locally consumed salt was non-iodized, and only 37.0% of industrial salt met the recommended ≥15 ppm iodine level. Women showed mild iodine deficiency (72.64 ± 7.64 µg/L), while children had borderline adequate status (97.00 ± 4.55 µg/L). Goiter prevalence was 31.2%, with

notable maternal and child undernutrition. Iodine status was significantly associated with socioeconomic factors and iodine-related practices ($p<0.05$).

**Table 1: Prevalence of iodine malnutrition of mothers by age category (n=33)** *

| Urinary iodine concentration (µg/L) | Status | Age (year) | | | |
|---|---|---|---|---|---|
| | | 15-34 n(%) | 35-49 n(%) | >49 n(%) | Total n(%) |
| 100 – 200 | Normal | 7(28.0) | 5(62.5) | 0(0.0) | 12(36.4) |
| 50 – 99 | Mild | 10(40.0) | 1(12.50 | 0(0.0) | 11(33.3) |
| 20 – 49 | Moderate | 8(32.0) | 2(25.0) | 0(0.0) | 10(30.3) |
| < 20 | Severe | 0(0.0) | 0(0.0) | 0(0.0) | 0(0.0) |
| Overall prevalence | | 25(75.8) | 8(24.2) | 0(0.0) | 33(100.0) |

*10% sample mothers**;** Median urinary iodine concentration = 72.64±7.64 µg/L

## CONCLUSION AND RECOMMENDATION:

Despite generally good iodine-related knowledge, attitudes, and practices, inadequate access to adequately iodized salt and socioeconomic challenges contribute to persistent iodine deficiency and undernutrition in Akpabuyo. The study recommends strengthening iodized salt distribution, enforcing salt iodization standards, intensifying community-based nutrition education, and targeting vulnerable households with appropriate nutritional interventions

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**Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition Sensitive and Specific Interventions Across Life Stages

**Title:** Household Water Security and **Food Safety Practices of Adults** in Selected Urban Slums in Ibadan North East Local Government Area, Oyo State

**Authors**: *Ajayi, F.D.[1], Oladipo D.A.[1], Arulogun T.W.[1], Ibidapo E.G.[1] and Samuel, F.O.[1]

**Affiliation of authors:** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo state, Nigeria.

**Corresponding Author (*):** ajayiferanmi18@gmail.com, +2347018794804

**Keywords**: Water Security, WASH, Food Safety KAP, Waterborne diseases

**Highlights**

- Approximately 7 out of 10 adults were water secure based on the household water insecurity experience scale.
- One-third of the adults did not have enough water to drink at least once in the last 30 days.
- Only one-half of the adults practiced appropriate safe food handling

**BACKGROUND AND OBJECTİVES:** In resource-limited settings, water insecurity disrupts household sanitation, places a burden on women and heightens the risks of waterborne diseases and stunting in children [1]. Concurrently, adherence to food safety guidelines in households serves as a defense against foodborne illnesses making it a vital public health focus. This study assessed household water security status and food safety knowledge, attitudes, and practices of adults in selected urban slums in Ibadan North East local government area, Oyo state.

**METHODS:** This study adopted a descriptive cross-sectional design. A multistage sampling technique was employed to randomly select three out of the twelve wards within the local government area and two communities representatives of an urban slum from each ward, making a total of six communities. Simple random sampling was thereafter used to recruit a total of 365 adults from the selected communities. An interviewer-administered questionnaire comprising a standardized "four-item household water insecurity experience scale" (4HWIES) [2] and food safety knowledge, attitude and practice [KAP] was used to obtain data on socio-demographic characteristics, water security status and food safety KAP of the respondents. Data analysis was aided by the use of SPSS version 27 and descriptive statistics were used to categorize variables while Pearson's correlation coefficient was used to evaluate the association between water security and food safety practices.

**RESULTS AND DISCUSSION**: This study revealed that 70% of participants were water secure based on 4HWIES, of which 57.1% of them practiced appropriate water sanitation, with one-third of the respondents lacking adequate drinking water. This is similar to the study, which showed that only about 70% of Nigerians had access to portable water [3]. Women constituted 80% of the study participants, reflecting the predominant role of women in household water-related activities. Notably, despite high positive attitudes toward food safety (90.3%) and moderate knowledge (66.0%), appropriate food safety practices was low at 47.2%, pointing to a significant gap between attitude and actual practice. Statistical analysis revealed a statistically significant, but a very weak and negative correlation between household water security status and food safety practices ($r = -0.088$, $p = 0.046$, $N = 365$). When poor access to water combines with unsafe food and sanitation practices, it leads to frequent infections and malnutrition risks for children.

**Table 1: Respondents' Food Safety Knowledge, Attitude and Practice**

| Food Safety Knowledge, Attitude and Practice | Percentage (%) |
|---|---|
| Average knowledge on food handling | 57.6 |
| Average knowledge on personal hygiene | 90.2 |
| Average knowledge on water sanitation | 50.1 |
| **Total knowledge on food safety** | **66** |
| Average positive personal hygiene attitude | 98.9 |
| Average positive attitude towards water sanitation | 83.2 |
| Average positive attitude towards safe food handling | 88.9 |
| **Total positive attitude towards food safety** | **90.3** |
| Average appropriate practice food handling practice | 62.9 |
| Average appropriate practice personal hygiene practice | 27.4 |
| Average appropriate practice water sanitation | 51.23 |
| **Total appropriate food safety practice** | **47.2** |

## CONCLUSION AND RECOMMENDATION(S):

This study showed that household water security alone does not guarantee safe sanitation or adequate food handling practices in slum urban settlements. Despite moderate knowledge and high positive attitudes toward food safety, actual practice remains low. To effectively combat malnutrition and infection in urban slums, public health initiatives must reinforce the existing Maternal, Infant, and Young Child Nutrition (MIYCN) framework by tightly operationalizing Water, Sanitation, and Hygiene (WASH) programs within its delivery. This requires bringing water access points closer to households to relieve women's domestic burdens while delivering practical, hands-on training that translates food safety awareness into actual practice.

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**Theme/ Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages.

**Paper title:** Development of lessons and tools for the nutrition education of mothers in Nsukka rural community; Enugu State, on infant feeding practices.

**Authors:** *Edeh, R.I.[1], Anichukwu A.V.[1], Agbo, E.C.[1]

**Affiliation of Authors:** [1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka.

***Corresponding Author's e-mail:** raphael.edeh@unn.edu.ng

**Keywords:** Nutrition education, mothers, infant feeding practices.

**Highlights**

- The lessons and tools presented were very effective
- There was a negative marginal relationship between the pre-demonstration tools and the post-demonstration tools.

## BACKGROUND AND OBJECTIVES

The first 1000 days of life (from pregnancy to 2years of life), is a critical window in the development of every child and present a golden opportunity for effective nutrition interventions [1]. Therefore, it is important to improve feeding and care practices during this period to enhance the child's optimal physical and mental development [2]. There is need, not only to ensure an improvement in the rate of exclusive breastfeeding but in the general quality of other infant feeding practices adopted by mothers. To achieve this, a structured comprehensive nutrition education of mothers on the acceptable infant feeding practices becomes indispensable. This is because, even when mothers show willingness to practice exclusive breastfeeding and subsequently adopt adequate complementary feeding, they still need to be guided on the right practices, through nutrition education.

Presently, inspite of the interventions of the government and its agencies to improve on the national rate of exclusive breastfeeding and adequate complementary feeding, nutrition education of the mothers remains limited, especially in rural areas. Hence, this study focused on the development of lessons and tools for the nutrition education of mothers in Nsukka rural community on infant feeding practices.

## MATERIALS AND METHODS

A descriptive cross sectional study design involving 80 pregnant women attending ante natal clinics in two rural hospitals of Nsukka Local Government Area, Enugu State was used for the study. A sub-sample of 30 mothers randomly selected from the sample was used for the demonstration and participatory sessions. Information on the baseline knowledge of the mothers on exclusive breastfeeding, complementary feeding and growth monitoring was obtained using a validated pretested structured pre-demonstration questionnaire. Information obtained was used to develop the lessons taught. A post-demonstration questionnaire was subsequently used to evaluate the impact of the nutrition education lessons and tools on the knowledge of the mothers on infant feeding practices. Data were analysed using a computer software;

Statistical Product for Service Solution, Version 21, and presented as means, frequencies and percentages. Analysis of Variance and Pearson's correlation were used to compare means and determine the effectiveness of lessons and tools demonstrated ($p < 0.05$).

## RESULTS AND DISCUSSION

**Table 1: Scores on the nutrition knowledge of the mothers**

| Variable | Mean Score<br>Mean±SD | p- value |
|---|---|---|
| Pre-demonstration | 71.78±13.20 | 0.975 |
| Post-demonstration | 78.54±18.38 | |

SD = Standard deviation

There was an improvement in the nutrition knowledge of the mothers after the administration of the nutrition education lessons and tools (Table I). Findings from this study were in line with reports from earlier studies [3].

## CONCLUSION AND RECOMMENDATIONS

The lessons and tools presented were effective. More efforts should therefore be made to develop the administered lessons and tools in English and local languages for wider application in the nutrition education of mothers in the Local Government Area and beyond on adequate infant feeding practices.

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**Sub – theme: MIYCN as a veritable framework for delivering nutrition sensitive and specific intervention across life stages.**

**Title: Maternal weekly food group consumption and body composition of pregnant women (18 – 45 years) attending antenatal clinic at the Federal Medical Centre (FMC), Umuahia.**

**Authors:** *Ikpemo, K. O. [1], Solomon, O. C. [2], Chibueze, C.[2] and Ogbonna, R. A.[2]

**Affiliations:** [1]Human Nutrition and Dietetics Department, Michael Okpara University of Agriculture, Umudike.

[2]Federal Medical Centre, Umuahia, Abia State.

***Corresponding author,** email: Ikpemo.kelechi@mouau.edu.ng, +234064182383

**Key words:** Maternal dietary pattern, body composition

- Most pregnant women consumed cereals and leafy greens as staples.
- More than two – thirds of the women had low skeletal muscle mass.
- Excessive weight gain was prevalent.

**Background and objective:** Maternal mortality rate remains high linked to inadequate antenatal care and poor maternal nutrition [2]. The study investigated the weekly food group consumption frequency and body composition of pregnant women attending antenatal clinic in Federal Medical Centre (FMC), Umuahia.

**Materials and methods:** Descriptive cross sectional study design was used in the study. Using convenience sampling procedure 112 pregnant women were selected for the study. Structured questionnaire, anthropometric tools and BIA machine were used to collect data. Data obtained were analyzed using IBM SPSS statistics version 29 [3]

**Results and discussion**

**Table 1: Weekly Food Group Consumption Frequency among the Pregnant women.**

| **Food Groups** | **Items** | **Rarely Consumed** | | **Mostly Consumed** | | **Total** | |
|---|---|---|---|---|---|---|---|
| | | F | % | F | % | F | % |
| Cereals | Rice | 26 | 23.2 | 86 | 76.8 | 112 | 100.0 |
| DGLV | PL | 26 | 23.2 | 86 | 76.8 | 112 | 100.0 |
| Meats | Beef | 38 | 33.9 | 74 | 66.1 | 112 | 100.0 |
| Fish/Sea Foods | Fresh Fish | 38 | 33.9 | 74 | 66.1 | 112 | 100.0 |
| Eggs | Fowl Egg | 42 | 37.5 | 70 | 62.5 | 112 | 100.0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Milk/Products | Powdered Milk | 42 | 37.5 | 70 | 62.5 | 112 | 100.0 |
| WT & Roots | Yam | 59 | 52.7 | 53 | 47.3 | 112 | 100.0 |
| Vit. A Rich Fruits | Pawpaw | 59 | 52.7 | 53 | 47.3 | 112 | 100.0 |
| Legumes & Nuts | Groundnut | 62 | 55.4 | 50 | 44.6 | 112 | 100.0 |
| Vit. A Rich Veg. | Carrot | 67 | 59.8 | 45 | 40.2 | 112 | 100.0 |
| Oils And Fats | Oil | 72 | 64.3 | 40 | 35.7 | 112 | 100.0 |

Key: DGLV= Dark green leafy vegetable, PL= Pumpkin leaves, WT= White tubers

**Table 2: Body composition of the pregnant women attending antenatal clinic at Federal Medical Centre (FMC), Umuahia**

| **Variable** | **Frequency (F)** | **Percentage (%)** |
|---|---|---|
| **Skeletal Muscle Mass Status** | | |
| Low (< 24.3%) | 107 | 95.5 |
| Normal (24.3 – 30.3%) | 2 | 1.81 |
| High (>30.4%) | 1 | 0.9 |
| Total | 110 | 100.0 |
| **Visceral Fat Status** | | |
| Healthy (1- 9%) | 110 | 98.2 |
| Not Assessed | 2 | 1.8 |
| Total | 112 | 100.0 |
| **Gestational Weight Gain Status** | | |
| Obese | 61 | 58.1 |
| Overweight | 23 | 21.9 |
| Underweight | 15 | 14.3 |
| Normal | 6 | 5.7 |
| Total | 105 | 100.0 |

**Discussion:** A dietary pattern dominated by high consumption of cereals and leafy greens was observed, it aligns with the findings of [1]. This indicates a high carbohydrate; plant-based diet which while providing certain nutrients may significantly be deficient in other essential nutrients including

protein and healthy fats. Low skeletal muscle mass and excessive weight gains were observed from body composition assessment of the women. This may pose adverse pregnancy outcome.

**Conclusion:** A greater population of the pregnant women predominantly consumed cereals and leafy vegetables alongside high prevalence of low skeletal muscle mass and excessive weight gain presenting heightened risks for adverse outcomes. However, most participants maintained healthy visceral fat levels. Awareness should be created on diversified diet and moderate exercises.

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**Subtheme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

## Fruit preferences and knowledge of fruit consumption benefit among School-aged Children in Owerri: A Baseline Assessment

Ezenwa, C. J. [1] ,Onuoha, F.A., [1] Chiboo , J. E. [1] Anyakorah, P.E.,[1,2] Akam, V.N[1]

[1]Federal University of Technology, Owerri, Nigeria.

[2] Centicini Team Ltd.

Corresponding Author, judith.obi@futo.edu.ng +2347034746099

Keywords: *Fruit preferences, School-aged, knowledge, fruit consumption*

- Most school-aged children understood that fruit consumption is beneficial although the reasons were inconsistent among groups.

**BACKGROUND AND OBJECTIVES:**

Fruit consumption is a component of a healthy diet [1]. Knowledge of their benefits and preferences is important for school-aged children and can significantly improve their motivation to consume them [2]. In addition to this, they can also be a good substitute for pre-packaged sweetened beverages often included in school lunch packs [3]. Previous studies have reported the inclusion of fruits in children's diets, but very few studies have explored which fruits children prefer and assessed whether they understand the benefits. This is very important to tailor interventions aimed at improving consumption. This study aimed to assess and compare food preference and knowledge of the benefits of food consumption among school-aged children in the intervention and control groups prior to intervention.

**MATERIALS AND METHODS**:

A quasi-experimental design was adopted for the parent study; this abstract reports baseline data comparing food preferences and knowledge of fruit consumption among children aged 6-13 years in the intervention (n=300) and control (n=294) groups at the Federal University of Technology Staff School and Ihiagwa Primary School in Owerri. Participants were selected through a multi-stage random sampling technique. Data were collected using a structured, pre-tested questionnaire assessing socio-demographic characteristics, fruit preferences, and the perceived benefits of fruit consumption. Data were analysed using descriptive statistics and Chi-square tests (p=0.05) in SPSS v27 to compare categorical variables.

**RESULTS AND DISCUSSION**:

A total of 594 pupils participated (300 intervention, 294 control), with mean ages of 9.23±1.85 and 9.86±1.77 years, respectively. At baseline, 300 pupils were assessed in the intervention group and 294 in the control group. Apple was the most preferred fruit in both groups (50.3% vs. 44.2%), followed by orange (15.3% vs. 17.3%) and banana (13.0% vs. 10.2%). Over 98% of pupils in both groups showed general awareness that fruit consumption is beneficial. However, knowledge of specific benefits varied: fewer pupils in the intervention group knew that fruit "makes you stronger" (10.0% vs. 58.5% in control) or "gives energy" (11.3% vs. 24.8%), while more knew that it "helps fight sickness" (87.0% vs. 38.1%) and "helps digestion" (61.3% vs. 30.6%).

**Table 1:Socidemographic characteristics of the respondents**

| Variable | Intervention | Control |
|---|---|---|
| Sample size (baseline), N | 300 | 294 |
| **Age** | | |
| 6 | 42 (14.0) | 9 (3.1) |
| 7 | 51 (17.0) | 26 (8.8) |
| 8 | 41 (13.7) | 33 (11.2) |
| 9 | 55 (18.3) | 54 (18.4) |
| 10 | 56 (18.7) | 52 (17.7) |
| 11 | 44 (14.7) | 52 (17.7) |
| 12 | 10 (3.3) | 62 (21.1) |
| 13 | 1 (0.3) | 6 (2.0) |
| Mean age ±SD (years) | 9.23 ± 1.85 | 9.86 ± 1.77 |
| **Gender** | | |
| Male | 119 (39.7) | 126 (42.9) |
| Female | 181 (60.7) | 168 (57.1) |
| **Ethnicity** | | |
| Igbo | 282 (94.0) | 269 (91.5) |
| Hausa | 2 (0.7) | 0 (0.0 **)** |
| Yoruba | 9 (3.0) | 3 (1.0) |
| Others | 7 (2.3) | 22 (7.5) |

**Table 2: Specific benefits of eating fruits**

| | | |
|---|---|---|
| **Fruit preference** | | |
| Orange | 46 (15.3) | 130 (44.2) |

| Variable | Intervention | Control |
|---|---|---|
| Mango | 22(15.3 | 0 (0.0) |
| Apple | 151(50.3) | 130 (44.2) |
| Carrot | 5(1.7) | 18 (6.1) |
| Pineapple | 7(2.3) | 30 (10.2) |
| Water melon | 10(3.3) | 8 (2.7) |
| Cucumber | 6(2.0) | 11 (3.7) |
| Banana | 39 (13.0) | 30 (10.2) |
| Strawberry | 8(2.7) | 0 (0.0) |
| **General awareness fruit is beneficial** | | |
| Yes | 294 (98.0) | 293 (99.3) |
| Not sure | 6 (2.0) | 1 (0.3) |
| **Knowledge of specific benefits** | | |
| **Gives energy** | | |
| Yes | 34 (11.3) | 73 (24.8) |
| No | 266 (88.7) | 221 (75.2) |
| **Helps to fight sickness** | | |
| Yes | 261 (87.0) | 112 (38.1) |
| No | 39 (13.0) | 182 (61.9) |
| **Makes you stronger** | | |
| Yes | 30 (10.0) | 172 (58.5) |
| No | 270 (90.0) | 122 (41.5) |
| **Helps food to digest** | | |
| Yes | 184 (61.3) | 90 (30.6) |

| Variable | Intervention | Control |
|---|---|---|
| No | 116 (38.7) | 204 (69.4) |
| **Improve skin health** | | |
| Yes | 294 (98.0)] | 294 (100.0) |
| No | 6 (2.0) | 0 (0.0) |

## CONCLUSION AND RECOMMENDATIONS:

Although school-aged children recognize fruit as generally healthy, their understanding of why it is beneficial remains incomplete and inconsistent, highlighting a need for targeted nutrition education alongside fruit-focused interventions. School-based nutrition interventions should incorporate specific, age-appropriate education on the functional benefits of fruit consumption to build more holistic knowledge among pupils.

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**SUB THEME 2: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages**

## Nutritional Status of Under-Five Children and their Household Dietary Pattern in Owo Local Government, Ondo State, Nigeria

**[1,2]Adedayo, E.O., [1]Dada, I. O, [3]Umeaku, P.O, [1, 4,5 *]Olanrewaju, O.I**

[1]Department of Human Nutrition and Dietetics, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria

[2]Department of Nutrition and Dietetics, Rufus Giwa Polytechnic, Owo, Ondo State

[3]Nutrition and Dietetics Department, Obafemi Awolowo University Teaching Hospital, Ile-Ife, Osun State

[4]Department of Nutrition and Dietetics, Federal University of Technology, Akure

[5]Department of Epidemiology, School of Public Health, University of Port Harcourt, River State

*Correspondence Author: olanrewajuoi@pg.abuad.edu.ng

**Keywords:** Under-five children, Nutritional status, Household, Dietary pattern.

### Background

Nutritional status reflects the overall health and wellbeing of an individual. Much of a child's future is determined during the first 1,000 days (conception to 2 years). It is essential for children below the age of five years to receive adequate and varied diets in order to attain optimal physical and mental growth [1]. Children whose diet falls short of standard level of intake of essential nutrients are prone to malnourished [2]. Malnutrition is a major public health challenge responsible for high incidence of mortality globally. Nigeria remains one of countries experiencing the menace.

### Objective

The study was conducted to assess the nutritional status of under-five children and their household dietary pattern in Owo, Ondo state, Nigeria.

### Methods

The study was a descriptive cross sectional study in design conducted in a semi-urban area of Owo in Ondo State. A semi-structured questionnaire was used to obtained data from the caregivers of 420 children, selected by multistage random sampling. The nutritional indices such as weight for age, height for age and weight for height) were determined using WHO standard. Children with Z-scores < -2SD were classified as underweight, stunted and wasted respectively and overweight respectively [3]. Statistical package for social science (SPSS) version 27 was used to analyze data. Descriptive statistics such as frequencies, and percentage was used to present data. Chi-square was employed to determine the association between variables while level of significance was set at $p<0.05$.

### Results/Discussion

Findings show that females (7.6%) were underweight, stunted (7.4%) and wasted (7.1%) more than their male counterparts**.** There were statistically significant associations between food security, age of child, age of mother, income, occupation and child nutrition status ($p> 0.05$). Also, some socio-demographic factors had significant association with nutritional status; height for age and age of mother ($P = 0.028$), weight for age and monthly income ($P = 0.009$), weight for height and monthly income ($p = 0.011$), weight for height and occupation ($P= 0.044$), MUAC and place of residence ($P= 0.001$), MUAC and occupation ($P = 0.000$), MUAC and occupation of spouse ($P = 0.000$).

**Conclusion/Recommendation**

Double burden of malnutrition identified in the study and with stunting more prevalent than wasting and overweight. A consistent finding was the association of mother's age, occupation and income on nutritional status of the infants. Nutrition and general Counseling as well as empowerment of the women are therefore recommended.

**Table 1: Nutritional status of children by gender**

| Indicators | Male(%) | Female (%) | Total (%) | $X^2$ | P-value |
|---|---|---|---|---|---|
| **Weight for age (WAZ)** | | | | **2.790** | **0.248** |
| Underweight | 16(3.8) | 32(7.6) | 48(11.4) | | |
| Normal | 152(36.2) | 180(42.9) | 322(79.0) | | |
| Overweight | 19(4.5) | 21(5.0) | 40(9.5) | | |
| **Height for age (HAZ)** | | | | **0.941** | **0.625** |
| Stunted | 25(6.0) | 31(7.4) | 56(13.3) | | |
| Normal | 145(34.5) | 174(41.4) | 319(76.0) | | |
| Very Tall | 17(4.0) | 28(6.7) | 40(10.7) | | |
| **Weight for height (WHZ)** | | | | **3.252** | **0.197** |
| Wasted | 25(3.3) | 30(7.1) | 44(10.5) | | |
| Normal | 145(36.7) | 182(78.1) | 336(80.0) | | |
| Overweight | 19(4.5) | 21(5.0) | 40(9.5) | | |
| **(MUAC)** | | | | **1.709** | **0.635** |
| Severe acute malnutrition (SAM) | 6(3.2) | 7(3.2) | 13(3.1) | | |
| Moderate acute malnutrition (MAM) | 26(13.9) | 23(9.9) | 49(11.7) | | |
| At risk of acute malnutrition | 46(24.6) | 62(26.6) | 108(25.7) | | |
| Well Nourished | 109(58.3) | 141(60.5) | 250(59.5) | | |

Significance $p<0.05$

**Table 2: Association of socio-demographic characteristics and nutritional status**

| Socio-demographic | Weight for age | | Height for age | | Weight for height | | MUAC | |
|---|---|---|---|---|---|---|---|---|
| **Variables** | **$X^2$** | **P-value** | **$X^2$** | **P-value** | **$X^2$** | **P-value** | **$X^2$** | **P-value** |
| Gender | 2.790 | 0.248 | 0.941 | 0.621 | 3.252 | 0.197 | 0.508 | 0.476 |
| Age of mother | 2.856 | 0.827 | 7.468 | 0.028* | 2.392 | 0.880 | 2.324 | 0.508 |
| Place of residence | 2.944 | 0.230 | 0.526 | 0.769 | 3.942 | 0.139 | 10.621 | 0.001* |
| Marital status | 2.675 | 0.348 | 4.847 | 0.564 | 2.871 | 0.825 | 0.616 | 0.893 |
| Religion | 2.737 | 0.603 | 2.824 | 0.588 | 3.648 | 0.456 | 1.773 | 0.412 |
| Education of mothers | 9.400 | 0.152 | 1.932 | 0.926 | 9.875 | 0.130 | 2.816 | 0.421 |
| Education of fathers | 7.120 | 0.310 | 0.578 | 0.997 | 7.444 | 0.282 | 5.959 | 0.114 |
| Occupation of mothers | 16.960 | 0.075 | 5.650 | 0.844 | 18.752 | 0.044* | 40.063 | 0.000* |
| Occupation of fathers | 16.233 | 0.093 | 5.902 | 0.823 | 17.986 | 0.055 | 41.738 | 0.000* |
| Monthly income | 16.968 | 0.009* | 6.260 | 0.395 | 16.468 | 0.011* | 5.697 | 0.127 |

*significant at $p<0.05$

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**Theme/Sub-theme: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across life stages**

# Impact of Maternal Education on Child Health Card Utilization, Growth Monitoring and Promotion, and Child Growth Trajectories Among Under-Two Children in Abeokuta, Nigeria

**Name of Author (s):** *Akinbule O.O.[1], Adepoju A.B. [1], Omemu, A.M. [2], Akerele, D.[3], Ayeyemi, V.A.[1], and Abdussalaam, R.O. [1]

**Affiliation of Authors:** *[1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Abeokuta [2]Department of Hospitality and Tourism, Federal University of Agriculture, Abeokuta, [3]Department of Agricultural Economics and Farm Management, Federal University of Agriculture, Abeokuta*

*Corresponding Author.Email: olufunkeakinbule@gmail.com

**Keywords:** complementary feeding, growth monitoring, child growth, maternal knowledge

## Highlights

- High rates of unchartered growth cards and poor nutritional literacy leave infants vulnerable.
- Structured maternal education dramatically improved complementary feeding practices.
- Maternal education improved child weight, length and head circumference.

**Background:** Childhood malnutrition remains a critical public health crisis in Nigeria, where high burdens of stunting and wasting threaten under-two children during their first 1,000 days [1]. While Child Health Cards (CHCs) and Growth Monitoring and Promotion (GMP) charts are vital for early detection, their utility is severely undermined by low maternal health literacy, poor card retention, and unchartered growth grids [2]. Although the prevalence of malnutrition is high [1], empirical research evaluating the combined impact of maternal education on complementary feeding knowledge, dietary practices, and health card utilization alongside longitudinal growth trajectories remain scarce in this region. This study evaluates the impact of a structured maternal educational intervention on complementary feeding knowledge, growth card utilization, and child growth trajectories in Abeokuta, Nigeria.

**Methods**: A longitudinal, community-based intervention study was conducted among 410 mother-child dyads of children aged 6-23 months. Data on socio-demographics, maternal knowledge on complementary feeding and growth cards was obtained using the maternal, infant and young child nutrition guideline. Physical card audit metrics (possession, charting, and plotting status) were directly observed, and anthropometric measurements were taken using standard procedure. A targeted 2-week maternal education module (2 hours/session) was administered to the intervention group, followed by bi-monthly growth and card tracking across eight visits for four months. Repeated-measures linear mixed-effects models and chi-square tests evaluated intervention interaction effects and associations between knowledge and utilization practices at $p< 0.05$.

## Results and Discussion

Most (52.7%) of the under-two children were males, and 44.6% caregivers had secondary education. While 95.1% had access to a health facility, 86.1% relied on primary health centres, making health workers (74.6%) the dominant source of child nutrition information, and only 12.2% mothers had adequate baseline complementary feeding knowledge. This emphasizes the urgent need for targeted, actionable nutrition

counselling embedded within routine immunization and antenatal visits. Although 68.3% of caregivers possessed growth cards, 51.7% of growth cards were unchartered, only 19.8% correctly understood card usage and 31.7% were unaware of its purpose. This shows structural access to health facilities alone is insufficient without health literacy. Interventions must move beyond simple card distribution to actively train caregivers in growth curve interpretation and enforce strict healthcare worker accountability for accurate charting.

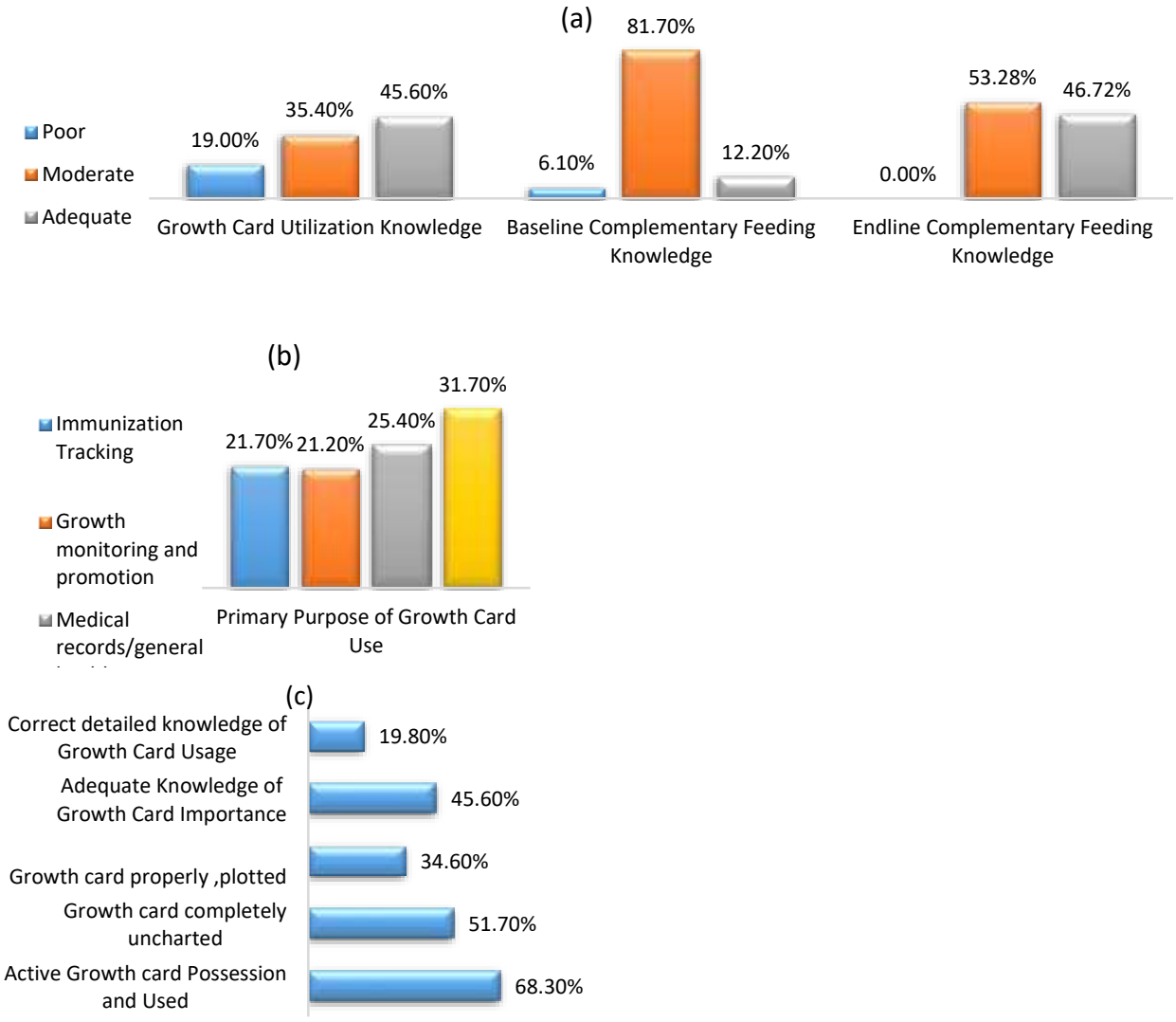



**Fig. 1: Baseline Maternal Knowledge on Complementary Feeding, Growth Cards and Utilization**

There is significant association between baseline and endline complementary feeding knowledge ($\chi2 = 78.190$, $p < 0.0001$). Also, higher maternal literacy correlated with growth card utilization ($\chi2 = 34.520$, $p < 0.0001$). Furthermore, there are significant association between minimum dietary diversity ($\chi2 = 21.550$, $p <0.0001$), consumption of eggs and/or flesh foods ($\chi2 = 10.500$, $p = 0.001$), and consumption of unhealthy foods ($\chi2 = 24.820$, $p < 0.0001$). Aligning with previous findings [3] These findings prove that closing knowledge gaps shift behaviours, making maternal nutritional literacy a key determinant of child health outcomes in resource-constrained settings. Compared to control groups, the intervention group experienced a statistically significant additional average weight gain ($\beta = 0.07$, $p < 0.001$), length ($\beta = 0.350$, $p < 0.001$),

head circumference ($\beta = 0.043$, $p = 0.007$) and MUAC change ($\beta = 0.012$, $p > 0.05$) per visits. This divergence confirms that empowering mothers with nutritional literacy and growth-curve interpretation may improve better feeding choices and enable early detection of growth faltering.

**Conclusion**: Maternal nutritional literacy directly drives child health card utilization and feeding practices. In Abeokuta, educational interventions successfully bridge critical knowledge gaps, improving dietary diversity and accelerating child growth trajectories.

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**SUB THEME 2: MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions Across Life Stages**

# TITLE: FOOD SECURITY AND COMPLEMENTARY FOODS QUALITY WITHIN HOUSEHOLDS OF INFANTS AND YOUNG CHILDREN (6-23 MONTHS) IN BABBAN DODO COMMUNITY, ZARIA LGA, KADUNA STATE

**AUTHORS**:

Agboola, F. O.[1,2], Owolabi, A. O.[2], Maimuna L[2]., Sarah J. I[2]., Firdausi U. K.[2], Fatima I.[2], Nana Firdausi, A[2]. Mbochi, A.L.C[1]., and Shanu A.L[1].

[1]Department of Nutrition and Dietetics, Shehu Idris College of Health and Sciences and Technology, Makarfi, Kaduna State, Nigeria

[2]Department of Biochemistry, Ahmadu Bello University, Zaria, Kaduna State, Nigeria

*Corresponding author Email: agboolafatai2017@gmail.com , Tel: +2347063053525

**Key Words: Food Security, Complementary Food, Infant and Young Children**

## Highlights

- Majority of the households of infants and young children are food insecured
- No link found between household food security and infants/child intake of key food groups.

## BACKGROUND AND OBJECTIVES

Food security denotes all time physical and economic access to sufficient, safe and nutritious food that meets eaters' dietary needs and food preferences for an active and healthy life (1). Complementary foods are liquid, semi-solid and solid foods other than human milk and infant formula given to infants and young child for nutrients and energy (2). Poor complementary feeding practices contribute to the high prevalence of malnutrition among children aged 6-24 months (3). In Nigeria, malnutrition rates are alarmingly high among the children, with 8% wasting, 40% stunting and 27% underweight (4).

The study assessed food security and complementary foods quality within households of infants and young children (6-23 months) in Babban Dodo Community of Zaria LGA of Kaduna State

## MATERIALS AND METHODS

A descriptive, cross-sectional study was conducted at Babban Dado community, Zaria Local Government Area of Kaduna State, to assess the food security and quality of complementary food quality within the household of infants and young children (6-23 months). Sample size of 166 was calculated using Cochran formula, but only 100 caregivers and their wards gave their consent and assent. However, multistage sampling procedure was used to identify the caregivers and their wards within the marked households. A semi-structured questionnaire containing socio-demographic characteristics, food insecurity experience scale, and minimum dietary diversity was used in data collection. However, data collected were analyzed using frequency distribution tables and percentages for inferential purposes (Fisher's Exact Test)

## RESULTS AND DISCUSSION

Table 1: Association between Household Food Security and quality of Complementary Food

| Variable | | | Food Secure | Food Insecure | Fisher' Exact Test |
|---|---|---|---|---|---|
| | | | n (%) | n (%) | p-value |
| Breast Milk | Yes | 11 (23.9) | 35(76.1) | | <0.005* |
| | | No | 3 (6.5) | 43(93. 5) | |
| Grains, Roots and Tubers | | Yes | 10(16.4) | 51(83.6) | 0.791 |
| | | No | 4(13.8) | 25(86.2) | |
| Pulses, Nuts and Seeds | Yes | 12(19.0) | | 51(81.0) | 0.132 |
| | | No | 2(6.9) | 27(93.1) | |
| Dairy Products | Yes | 10(45.5) | | 12(54.5) | <0.005* |
| | | No | 4 (5.7) | 66(94.3) | |
| Fleshy/Animal Foods | Yes | 10(55.6) | | 8(44.4) | <0.005* |
| | | No | 4(5.4) | 70(94.6) | |
| Poultry (Eggs) | Yes | 13(38.2) | | 21(61.8) | <0.005* |
| | | No | 1(1.7) | 57(98.2) | |
| Vitamin A rich Foods | Yes | 12(24.0) | | 38(76.0) | <0.005* |
| | | No | 2(4.8) | 40(95.2) | |
| Fruits and Vegetables | Yes | 13(18.3) | | 58(81.7) | 0.129 |
| | | No | 1(4.8) | 20(95.2) | |
| Dietary Diversity | | Met | 12(41.4) | 17(58.6) | <0.005* |
| | | Unmet | 2(3.2) | 61(96.8) | |

**P value of less 0.005 level is significant*

The results showed that most households, 63 (68.5%) could not meet minimum dietary diversity which is in line with Pascal *et al*. (2017) that reported 64%. However, there was a strong relationship between household food security and breast milk, dairy product, fleshy foods, poultry (eggs) and vitamin A rich foods at p-values of <0.005 respectively.

## CONCLUSION AND RECOMMENDATIONS

The socio-demographic status of the household was poor due to inadequate access to quality education and improved standard of living; households are food insecured; and most caregivers give less protein to their children while only average number of them gave breast milk, which ultimately become unsatisfactory and nutritionally inadequate after six (6) month. However, the household members should have access to quality education, improved standard of living; embrace farming to be food secured; and caregivers should be financially empowered to be able to assist their infants and young children to meeting their minimum dietary diversity.

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# SUB-THEME 3: ORAL

**Theme/Sub-theme: Harnessing the Potential of the Private Sector in Ending Malnutrition in All Its Forms**

The Role of the Private Sector in Ending Malnutrition in All Its Forms: Opportunities, Contributions and Challenges

Ali A.I.*[1] and Hussain B.H.[2]

[1]Department of Food Science and Technology, Aliko Dangote University of Science and Technology, Wudil, Kano-Nigeria

[2] Department of Public Health, National Open University of Nigeria

Corresponding author: aishaidrisali@gmail.com Tel: +2348027545409

**Keywords:** Private sector, Malnutrition, Food systems, Nutrition interventions

**Highlights**

- Private sector partnerships improved access to nutritious foods
- Food fortification reduced micronutrient deficiencies among consumers
- Nutrition-sensitive investments strengthened food system outcomes

## BACKGROUND AND OBJECTIVES

Malnutrition in all its forms, including undernutrition, micronutrient deficiencies, overweight, and obesity, remains a major public health challenge globally and particularly in low- and middle-income countries such as Nigeria. Despite significant investments by governments and development partners, progress toward achieving nutrition targets has been slow due to inadequate resources, weak food systems, and limited access to affordable nutritious foods [1]. The private sector plays a critical role in food production, processing, distribution, marketing, and innovation, positioning it as an important stakeholder in addressing malnutrition [2].

Private-sector involvement can contribute to improved nutrition outcomes through food fortification, development of affordable nutrient-dense foods, responsible marketing practices, and investments in nutrition-sensitive agriculture [3]. However, evidence on the effectiveness of private-sector interventions in improving nutrition outcomes remains fragmented.
This study assessed the contribution of private-sector initiatives to reducing malnutrition and explored opportunities for strengthening partnerships between government, civil society, and businesses to accelerate progress toward ending malnutrition in all its forms.

## MATERIALS AND METHODS

A descriptive review approach was adopted. Relevant peer-reviewed articles, policy documents, technical reports, and publications from international organizations published between 2015 and 2025 were systematically reviewed. Literature was sourced from electronic databases including Google Scholar, PubMed, and institutional repositories using keywords such as "private sector," "nutrition," "food fortification," "malnutrition," and "food systems."

Studies were selected based on their relevance to private-sector engagement in nutrition interventions. Information extracted included intervention type, target population, implementation strategy, and nutrition outcomes. Findings were synthesized narratively to identify key contributions, challenges, and opportunities associated with private-sector participation in nutrition improvement initiatives.

## RESULTS AND DISCUSSION

The review revealed that private-sector involvement contributes significantly to addressing malnutrition through multiple pathways. Food fortification programs implemented by food manufacturers were found to improve the availability of essential micronutrients such as vitamin A, iron, zinc, and iodine among vulnerable populations [2]. Several studies reported reductions in micronutrient deficiencies where fortified foods were widely consumed [4].

The private sector also contributed through investments in nutrition-sensitive agriculture, improved food processing technologies, and development of affordable complementary foods for infants and young children. Partnerships between governments and food industries enhanced compliance with national fortification standards and increased market access to nutritious products [3]. Furthermore, digital technologies and innovative supply chains employed by private enterprises improved food accessibility, especially in underserved communities. However, challenges identified included inadequate regulation of food marketing, conflicts between commercial interests and public health goals, and limited accountability mechanisms [5]. These findings highlight the importance of establishing clear regulatory frameworks and multi-sectoral collaboration to maximize the positive impact of private-sector engagement while minimizing potential risks.

## CONCLUSION AND RECOMMENDATIONS

The private sector possesses substantial capacity to contribute to ending malnutrition in all its forms through food fortification, innovation, investment, and improved food distribution systems. Strategic partnerships involving government agencies, development organizations, academia, and private enterprises can accelerate progress toward achieving national and global nutrition targets.
It is recommended that governments strengthen regulatory oversight, encourage responsible business practices, and create enabling environments that promote investments in nutrition-sensitive interventions. Public-private partnerships should be expanded to improve access to affordable, safe, and nutritious foods, particularly among vulnerable populations.

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**Sub-Theme: Harnessing the Potential of the Private Sector in Ending Malnutrition in All Its Forms**

**Title: Potentials of Private Sector Initiatives towards Achieving Food Security: A Study of Peace Agro-Innovate Ventures in Imo State**

**Name of Author(s)**:*Okwulehie, F. C., [1], Ukozor,AUC [1], & Ukwujiagu C.U[1]

[1]Department of Home Economics and Hospitality Management, Alvan Ikoku Federal University of Education, Owerri, Nigeria.
*Corresponding Author: Email: tonyokwulehie@yahoo.com;Phone: +234 803 342 3174

**Keywords:** Private sector,Food security

**Highlights:**

- Peace Agro-Innovate Ventures plays a significant role in enhancing food security in Imo State.
- Inadequate government support, lack of funding, poor rural infrastructure, limited market access, and inadequate access to modern agricultural technologies are the major challenges limiting the contributions of Peace Agro-Innovate Ventures to food security in Imo State.

**BACKGROUND AND OBJECTIVES:**Food security is essential for human well-being and sustainable development, yet Nigeria continues to face significant food insecurity despite its vast agricultural potential [1] Increasingly, private-sector investments and innovations are recognized as important drivers of agricultural productivity and food security [2] However, empirical evidence on the effectiveness of these initiatives in Nigeria remains limited [3]. This study therefore examined the potential of Peace Agro-Innovate Ventures in Imo State to improve food production and food security, and identified the challenges limiting its contributions.

**METHODOLOGY:** The study adopted a quantitative approach using a descriptive survey research design because it was appropriate for collecting numerical data from respondents and describing their views on the role of private sector initiatives in achieving food security. The design also allowed for objective data analysis and the generalization of findings to the target population. The target population comprised 1,250 registered farmers and staff of Peace Agro-Innovate Ventures in Imo State. A sample of 348 respondents was selected using stratified random sampling because it ensured adequate representation of the different categories of respondents, thereby enhancing the representativeness and reliability of the study findings. Data were collected using a structured four-point Likert-scale questionnaire. Descriptive statistics (mean and standard deviation) were used to answer the research questions, while the Chi-square ($\chi^2$) statistic was employed to test the hypotheses at the 0.05 level of significance.

**Results and Discussion**

**Table 1:** The roles of Peace Agro-Innovate Ventures in enhancing food security in Imo State

| S/N | Statement | Mean | Standard Deviation | Variance | Coefficient of Variation (CV) | Range (Min–Max) |
|---|---|---|---|---|---|---|
| 1 | Peace Agro-Innovate Ventures strengthens farmers' capacity to produce sufficient food. | 2.93 | 1.40 | 1.96 | 0.48 | 1–5 |
| 2 | It improves farmers' access to agricultural support services. | 2.92 | 1.45 | 2.10 | 0.50 | 1–5 |
| 3 | Provides training that improves food security. | 3.02 | 1.40 | 1.96 | 0.46 | 1–5 |
| 4 | Promotes sustainable agricultural practices. | 3.01 | 1.40 | 1.96 | 0.47 | 1–5 |

The findings revealed that respondents agreed that Peace Agro-Innovate Ventures plays a significant role in enhancing food security in Imo State by providing farmer training, promoting sustainable agricultural practices, strengthening farmers' production capacity, and improving access to agricultural support services.

The findings showed that inadequate government support, lack of funding, poor rural infrastructure, limited market access, and inadequate access to modern agricultural technologies are the major challenges limiting the contributions of Peace Agro-Innovate Ventures to food security in Imo State.

**CONCLUSION AND RECOMMENDATIONS:**The study concludes that Peace Agro-Innovate Ventures has significant potential to enhance food security in Imo State through private-sector agricultural initiatives. It recommends stronger collaboration among stakeholders and increased investment in farmer training, digital agriculture, rural infrastructure, and agricultural financing to improve food production and household food security.

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**Theme: DELIVERING BETTER NUTRITION FOR ALL: CONNECTING THE DOTS ACROSS LIFE CYCLE, SYSTEMS, & SECTORS**

**Subtheme: HARNESSING THE POTENTIAL OF THE PRIVATE SECTOR IN HANDLING MALNUTRITION IN ALL ITS FORMS.**

# Title: HARNESSING THE POTENTIAL OF NUTRITION EDUCATION AND MOBILE PHONE INTERVENTION IN IMPROVING MATERNAL IRON STATUS OF PREGNANT WOMEN IN ABEOKUTA METROPOLIS

***Ifebajo, A.Y[1], Ifebajo, I.P, Afolabi, W.A.O[2], Sanni,S.A[2], Fapojuwo,O.E[2], Onabanjo,O.O[2], Oladoyinbo,C.A[2], Ilo,J.G[3], Ilori,O[4] &Akinhanmi-Uthman, Y.[5]**

1. **Department of Home Economics Education, Federal College of Education (Tech) Akoka, Lagos, Nigeria**
2. **Department of Nutrition & Dietetics, Federal University of Agriculture, Abeokuta. Nigeria**
3. **Department of Human Nutrition & Dietetics, Osun State University, Osun State, Nigeria.**
4. **Department of Nutrition & Dietetics, Moshood Abiola Polytechnic, Ogun State, Nigeria.**
5. **Department of Home Science and Hospitality Management, Nutrition & Dietetics Unit, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria.**

***Correspondence author, email:preciousyettyesther@gmail.com, +2349030442793**

**Highlights** :

3. Integrating behavioural education with digital reinforcement strategies enhances intervention effectiveness

**Background and Objectives:** Poor maternal iron status and supplementation compliance remain a significant challenge in Nigeria despite ongoing antenatal care programs[2]. The increasing availability of mobile phones coupled with nutrition education present opportunities for integrating digital health strategies for improving maternal iron status[1].This study aimed at determining the effects of Nutrition education and mobile phone reminders in improving maternal iron status.

**Materials and Methods:** The study adopted a randomised control trial. Systematic random sampling was used to recruit 170 pregnant women of 12 weeks gestation age within the ages of 18-49 years who were attending ante-natal clinics from 4 different maternity hospitals in Abeokuta metropolis Ogun State. 132 of the respondents were found to be eligible for the study in that they passed the C-reactive protein, malaria screening tests and were iron deficient ( Hb≥11g/dl; SF<30ug/l). The respondents were grouped into 4; control group (35) and 3 Intervention/Treatment groups. (Treatment 1/Nutrition Education group (32), Treatment 2/Mobile phone reminders (32) and Treatment 3/ Nutrition Education + Mobile phone reminders (33).The intervention lasted for 26 weeks. The iron status of the respondents under study were assessed after the intervention. Data was analysed using descriptive statistics; frequencies, percentages, means, standard deviation and Inferential statistics; chi-square tests and analysis of variance. Statistical significance was set at $p<0.05$.

**Results and Discussion:** Findings showed that Hemoglobin, Packed Cell Volume and Ferritin levels of the respondents improved significantly across all the treatment groups compared with the control group. Respondents with combined treatment i.e. Treatment 3(Nutrition Education + Mobile Phone reminders) showed the highest mean increase (Hb=2.545, PCV=1.515 & Iron ferritin=1.333) followed by Treatment

2/Mobile phone reminders (Hb=2.094, PCV=0.650 &Iron Ferritin=1.156) and Treatment 1/Nutrition Education (Hb=1.844, PCV=0.656 & Iron ferritin =0.938). The Control group demonstrated the least improvement. (Hb=0.429, PCV=0.457 & Iron Ferritin=0.086).

**Table 1: Iron status of Pregnant women After Intervention**

| Variables | Control (n=35) | Nutrition education only (n=32) | SMS/Calls only (n=32) | Nutrition Education +SMS/Call (n=33) |
|---|---|---|---|---|
| Iron sufficient (Hb>11g/dl ;SF>30ug/l) | - | 29(90.6) | 28(87.5) | 31(94.0) |
| Iron deficient ( Hb ≥ 11g/dl;SF< 30ug/l) | 35(100) | 3(9.4) | 4(12.5) | 2(6.0) |

**Conclusion and Recommendation:**The findings indicate that integrating mobile health strategies with nutrition education enhances maternal health behaviour which invariably improves maternal iron status. Furthermore, the effectiveness of the combined intervention suggests that a multi-component approach is more effective than stand-alone interventions in improving maternal iron status. Thus it is recommended that nutrition education and mobile phone should be integrated into antenatal care to improve maternal iron status.

**Keywords:** Maternal Iron Status, Iron Deficiency, Nutrition Education, Mobile Health.

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# SUB-THEME 3: POSTER

**Harnessing the Potential of the Private Sector in Ending Malnutrition in All Its Forms**

**Food Safety Knowledge and Practice Among Food Handlers in Restaurants in Nsukka Town, Enugu State, Nigeria**

***Okafor A.M.[1], Uche D.M.[1] and Agbo E.C.[1]**

[1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka

Email: adaobi.nwabunze@unn.edu.ng +2347065241552

**Keywords:** Food safety, Food handlers, Food safety knowledge, Food safety practice

**Highlights**

- Income and internal supervision affected food handlers' food safety practice.
- Frequency of food safety training and work experience was significantly linked to food safety knowledge.

## BACKGROUND AND OBJECTIVE

Nsukka town is a university town hosting the University of Nigeria of which university staff and students make a greater part of its population that depend mostly on food establishments or food vendors for food [1]. Given Nsukka's vibrant restaurant setting and its significant student population, food handlers in these restaurants play a crucial role in safeguarding the health of the public. Hence, this study was aimed to assess the food safety knowledge and practices among food handlers in restaurants in Nsukka town, Enugu state, Nigeria.

## MATERIALS AND METHODS

A structured interviewer-administered questionnaire was used to elicit information on socio-demography, food safety knowledge, food safety practice and factors that may affect food safety knowledge and practice to collect data from the respondents. Ethical consent was obtained from University of Nigeria Teaching Hospital (UNTH), Ituku-ozalla prior to the commencement of the study. This study included all consenting food handlers (n=247) in all consenting restaurants (n=62) in Nsukka town. Data obtained were coded and analyzed using the Statistical Package for Social Sciences (SPSS) software for windows, version 23 and presented in tables while using p-value > 0.05 to establish relationship.

## RESULTS AND DISCUSSIONS

Results showed that majority (71.7%) of the food handlers had average food safety knowledge and 67.6% had average food safety practice scores with no significant correlation between their knowledge and practice. The study also revealed that there was an association between education and training and food safety knowledge while food safety practice was influenced by income, frequency of food safety training and attitude of food handlers to responsibility and accountability to practice food safety.

**Table 1: Food safety knowledge and practice of respondents**

| Variables | Male n(%) | Female n(%) | Total n(%) | $X^2$; P-value |
|---|---|---|---|---|
| **Food safety knowledge** | | | | 5.895;0.052 |
| <50 (Poor) | 10(4.0) | 27(10.9) | 37(14.9) | |
| 50 to 75% (Average) | 27(10.9) | 150(60.7) | 177(71.6) | |
| >75% (Good) | 10(4.0) | 23(9.3) | 33(13.3) | |
| **Total** | **47(19.0)** | **200(81.0)** | **247(100.0)** | |
| **Food safety practice** | | | | 9.318;0.090 |
| 0 to 11 (Bad) | 3(1.2) | 6(2.4) | 9(3.6) | |
| 12 to 22 (Average) | 23(9.3) | 144(58.3) | 167(67.6) | |
| 23 to 33 (Good) | 21(8.5) | 50(20.2) | 71(28.7) | |
| **Total** | **47(19.0)** | **200(81.0)** | **247(100.0)** | |

## CONCLUSION AND RECOMMENDATIONS

Majority of the food handlers in Nsukka town were of average food safety knowledge and practice. Factors that affected their food safety knowledge and practice were more of educational, organizational and attitudinal rather than personal characteristics. We recommend frequent food safety training, adequate income and proper internal supervision to ensure that acquired food safety knowledge translates into good food safety practice.

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# SUB-THEME 4: ORAL

**Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors and Opportunities of an Overlooked Life Stage

**Title**: **DIETARY QUALITY INDICATORS AND CARDIO-METABOLIC RISK STATUS OF ADOLESCENTS ATTENDING PUBLIC AND PRIVATE SECONDARY SCHOOLS IN IBADAN METROPOLIS, NIGERIA**

**Name of Authors**: * Olaleye F. E. [1]., Ariyo O. [2]., Cadmus E. O. [3]

**Affiliation of Author:** [1]Department of Human Nutrition and Dietetics, Federal University of Agriculture and Technology, Okeho, Oyo State, Nigeria. [2]Department of Human Nutrition and Dietetics, University of Ibadan, Oyo State, Nigeria [3]Department of Community Medicine, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

*Corresponding author, e-mail**:** funmiolaleye@gmail.com, +2348034903315

**Keywords:** *adolescent nutrition; diet quality; cardio-metabolic risk; school types*

**Highlights:**

- Almost two-thirds (65.2%) of adolescents had at least one cardio-metabolic risk
- Public schools had higher diet quality but more metabolic abnormalities
- Parental cardio-metabolic risk history increased odds of overweight/obesity 11-fold

**Background and Objectives:** The rising prevalence of non-communicable diseases (NCDs) among adolescents is a growing global public health concern. Diet quality is a key modifiable determinant of cardio-metabolic risks (CMRs) [1], including elevated blood pressure, dyslipidaemia, hyperglycaemia, and obesity. However, evidence on dietary patterns and associated CMRs among Nigerian adolescents remains limited, particularly regarding differences by school type [2]. This study assessed dietary quality and cardio-metabolic risk status among adolescents attending public and private secondary schools in Ibadan, Nigeria.

**Materials and Methods:** This cross-sectional study involved 322 adolescents (10–19 years) selected through multistage random sampling from 4 public (n=170) and 4 private (n=152) secondary schools (8 in total) in Ibadan metropolis. Dietary intake was assessed using the validated Nigerian Diet Quality Questionnaire and the data was classified as "high" if scores of Global Diet Recommendation (GDR) ≥10, NCD-Risk >5 or NCD-Protect >5; otherwise, "low". Anthropometric measurements were used to determine BMI-for-age, while blood pressure, fasting blood glucose, and lipid profiles were assessed using standard procedures. Data were analysed using descriptive statistics, Chi-square and binary logistic regression to identify factors associated with CMRs at $p<0.05$.

**Results and Discussion:** Respondents' age was 13.9 ± 1.6 years and 52.5% were female. Overall, 65.2% had at least one CMR, indicating a considerable burden of early NCD risk. Diet quality was largely poor, with only 29.2% achieving a desirable GDR score (≥10) and 12.7% recording high NCD-Protect scores (≥5). Public school adolescents had significantly higher mean GDR (8.8 ± 2.0 vs 7.9 ± 2.1) and NCD-Protect (3.6 ± 2.3 vs 2.3 ± 1.8) scores than private school adolescents. Dyslipidaemia was the most prevalent CMR (48.8%), followed by elevated systolic blood pressure (11.2%) and hyperglycaemia (11.2%). Private school adolescents had higher prevalence of overweight/obesity (13.2% vs 4.7%) and elevated systolic blood pressure (15.1% vs 7.6%), whereas hyperglycaemia (18.2% vs 3.3%) and dyslipidaemia (52.9% vs 44.1%) were more common among public school students. Overweight/obesity was significantly associated with parental history of cardio-metabolic disease ($\chi^2$=51.59, p<0.001) and low NCD-Protect intake ($\chi^2$=4.47, p=0.034). Parental cardio-metabolic history was the strongest predictor of overweight/obesity (AOR=11.01; 95% CI: 4.50–26.91; p<0.001).

**Table 1: Dietary Quality Indicators among Adolescents by School Type**

| Indicator | Public Schools (n=170) | Private Schools (n=152) | p-value |
|---|---|---|---|
| GDR Score (Mean ± SD) | 8.8 ± 2.0 | 7.9 ± 2.1 | <0.001 |
| NCD-Protect Score (Mean ± SD) | 3.6 ± 2.3 | 2.3 ± 1.8 | <0.001 |

**Table 2: Prevalence of Major Cardio-Metabolic Risk Factors by School Type (N=322)**

| Risk Factor | Public Schools n(%) | Private Schools n(%) | Overall n(%) |
|---|---|---|---|
| Overweight/Obesity | 8 (4.7) | 20 (13.2) | 28 (8.7) |
| Elevated Systolic BP | 13 (7.6) | 15.1 (23) | 36 (11.2) |
| Hyperglycaemia | 31 (18.2) | 5 (3.3) | 36 (11.2) |
| Dyslipidaemia | 90 (52.9) | 67 (44.1) | 157 (48.8) |

**Conclusion and Recommendations:** Poor dietary quality and cardio-metabolic abnormalities are prevalent among adolescents in Ibadan, with distinct risk patterns by school type. Strengthening school-based nutrition interventions, promoting healthy food access, implementing routine cardio-metabolic screening, and targeting families with a history of cardio-metabolic diseases are essential to reduce future NCD risk.

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**Sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

## Impact Of Nutrition Education On Nutrition Knowledge Among Adolescents In Umuahia Metropolis, Abia State, Nigeria

Chijioke*, D.S.,[1] Ukegbu* P.O.,[1] Sopuru* J.C.,[1,2] Anyika-Elekeh* J.U.,[1] Okereke* I,[1] Kanu* R. U.,[3] Anyanwu* E.,[3] Onwuka* J.,[4] Okwunodulu*, C.C., [1] and Ukegbu* A.[5]

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria.

[2]Department of Food Science and Technology, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

[3]Department of Agricultural Extension, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria

[4]Department of Crop and Soil Science, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria

[5]Department of Community Medicine, Federal Medical Centre Umuahia, Abia state, Nigeria.

*Corresponding author, e-mail: samueldeborah179@gmail.com,+2347051262196

**KEYWORDS:** Nutrition education, adolescents, nutrition knowledge, school-based intervention.

**HIGHLIGHTS:**

- Good nutrition knowledge increased from 23.7% to 55.1%.
- Poor nutrition knowledge decreased from 76.3% to 44.9%.
- Mean knowledge scores improved significantly (34.52 to 36.94; p=0.018).

**BACKGROUND AND OBJECTIVES:**

Adolescence, defined by the World Health Organization (WHO) as the period between 10 and 19 years of age, represents a critical stage of human growth and development[1] Despite the importance of nutrition at this stage, studies have shown that adolescents generally possess inadequate nutrition knowledge and exhibit unhealthy eating habits [2], [3], [4] Evidence from systematic reviews shows that school-based nutrition education can significantly improve adolescents' nutrition knowledge and attitudes, though improvements in dietary behaviours are often modest and depend on intervention design and duration[3] This study assessed the effect of nutrition education on the knowledge and dietary habits of adolescents in Umuahia Metropolis, Abia State.

**MATERIALS AND METHODS:**

A quasi-experimental pre-test and post-test study with a control group was conducted among adolescents aged 10–19 years attending secondary schools in Umuahia Metropolis. One intervention school and one control school were selected using a multistage sampling technique. Baseline data on socio-demographic characteristics, nutrition knowledge, and dietary habits were collected using a structured, pre-tested questionnaire. The intervention school received structured nutrition education, while the control school received no intervention. Endline assessment was

conducted 6 months following the intervention. Data were analyzed using descriptive and inferential statistics, with statistical significance set at $p < 0.05$.

**RESULTS:**

Nutrition knowledge increased significantly from baseline to endline within the intervention group, whereas no significant improvement occurred within the control group. At baseline, there was no significant difference in nutrition knowledge between the intervention and control groups ($p > 0.05$). Following the intervention, the intervention group demonstrated a significant increase in mean nutrition knowledge score from 34.52 ± 5.50 to 36.94 ± 5.87 (paired $t = -2.430$, $p = 0.018$), whereas no significant improvement was observed in the control group ($p = 0.628$). Although the intervention group recorded a greater mean improvement than the control group (2.42 vs 0.45 points), the between-group difference in knowledge change was not statistically significant ($p = 0.153$). These findings demonstrate that structured nutrition education effectively enhances adolescents' nutrition knowledge and may contribute to healthier dietary choices when integrated into school health programmes.

**TABLE 1:**

***CHANGE IN NUTRITION KNOWLEDGE BETWEEN THE BASELINE AND ENDLINE WITHIN INTERVENTION GROUP (PAIRED ANALYSIS, N=133)***

| **Nutrition knowledge** | **BASELINE (n=156)** | **ENDLINE (n=133)** | **Mean change** | **x2/t test** | **P Value** |
|---|---|---|---|---|---|
| Score (mean ± SD) | 34.52±5.50 | 36.94±5.87 | **+2.42** | **-2.430** | **0.018** |
| Good knowledge,n (%) | 18(23.7) | 38(55.1) | | 0.128 | 0.784 |
| Poor knowledge, n (%) | 58 (76.3) | 31(44.9) | | | |

Paired sample t-test; statistical significance was set at $p < 0.05$

**TABLE 3:**

***change in nutrition knowledge between intervention and control groups (n=156)***

| **Group** | **F** | **Mean change ± SD** | **t-value** | **p-value** |
|---|---|---|---|---|
| **Intervention** | 69 | 2.42 ± 8.27 | | |
| **Control** | 64 | 0.45 ± 7.44 | **1.438** | **0.153** |
| **Mean difference** | | 1.97 | | |

**Independent-sample t-test; $p < 0.05$, based on the change in the score**

## CONCLUSION AND RECOMMENDATION:

Structured nutrition education resulted in a significant improvement in nutrition knowledge within the intervention group. Although the improvement was greater than that observed in the control group, the between-group difference was not statistically significant. School-based nutrition education remains a promising strategy for improving adolescent nutrition knowledge. Based on findings, nutrition education should be integrated into secondary school health programmes and curricula to promote healthier dietary habits.

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**Theme/sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factor, and opportunities of an overlooked life stage.

**Title:** Determinants of dietary adequacy and diet quality of in-school adolescent girls in Nigeria: Implications for non-communicable diseases**.**

**Name of Author (s):** Olumakaiye M.F.[1], Iheme G.O. [2,3] and Alagbo P.K.[1]*

**Affiliation of Author (s):**

[1]Department of Human Nutrition and Dietetics, Obafemi Awolowo University, Ile-Ife, Nigeria

[2]Department of Food Studies, Nutrition and Dietetics, Uppsala University, Uppsala SE-751 22, Sweden

[3]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Nigeria

**Corresponding author**: Alagbo P.K. **E-mail**: pkalagbo@oauife.edu.ng, +2348166627548

**Keywords:** Dietary intake, Food choices, NCD-Protective foods, NCD-Risk foods.

**Highlights**

- Large households showed higher All-5, NCD-Protect, and GDR scores than smaller households
- Girls who took daily money to school had higher All-5 but lower GDR scores
- The higher the All-5 and NCD-Protect food groups, the lower the BMI.

**BACKGROUND AND OBJECTİVES:**

Adolescent malnutrition, encompassing both undernutrition and overnutrition, remains a global public health concern, with dietary factors playing a critical role in shaping nutrient intake and future health outcomes [1]. This study assessed dietary adequacy, diet quality, and their determinants among adolescent girls, and examined their implications for overweight/obesity and non-communicable disease (NCD) risk.

**MATERIALS AND METHOD:**

A descriptive cross-sectional study was conducted among 2,261 in-school adolescent girls in Nigeria using stratified random sampling. Dietary adequacy (All-5), diet quality (NCD-Protect and NCD-Risk) based on Global Dietary Recommendations (GDR), and BMI-for-age (WHO growth reference) were assessed, and data were analyzed using descriptive and inferential statistics in SPSS version 27 at $p < 0.05$.

**RESULTS AND DISCUSSION:**

| Variable | Mean ± SD / Estimate | Statistical significance |
|---|---|---|
| Age (years) | 14.9 ± 1.8 | – |
| BMI (kg/m²) | 20.1 ± 3.7 | – |
| All-5 | 3.8 ± 1.1 | – |
| NCD-Protect | 2.4 ± 1.4 | – |
| NCD-Risk | 1.8 ± 1.7 | – |
| GDR | 9.7 ± 1.5 | – |
| Older adolescents | β = 0.20 (higher GDR) | p = 0.04 |
| Urban residence | Lower diet quality | p < 0.001 |
| Large households | Higher All-5, NCD-Protect and GDR | p < 0.05 |
| Daily school money | Higher All-5; lower GDR | β = 0.03–0.27; β = −0.30 to −0.22 |
| BMI correlation | All-5: r = −0.043; NCD-Protect: r = −0.054 | p = 0.039; 0.010 |

Table 1 presents the descriptive characteristics and key determinants of diet quality among participants. Mean age and BMI were 14.9 ± 1.8 years and 20.1 ± 3.7 kg/m², respectively, with 7% of adolescents classified as overweight or obese. Better diet quality was observed among older adolescents, those from larger households, and residents of the Southeast, whereas urban residence was associated with poorer diet quality. Dietary adequacy and NCD-Protect scores were inversely associated with BMI, indicating that healthier diets were linked to lower BMI. These findings support interventions that promote healthy dietary patterns and reduce NCD-risk food consumption among adolescents.

**CONCLUSION AND RECOMMENDATİON(S):**

Personal and sociodemographic characteristics influenced the respondents' dietary adequacy and quality. Higher All-5 and NCD-Protect food group scores lowered BMI. This can positively impact overweight/obesity reduction, thereby delaying NCDs' onset in later years. Conscious efforts should be made to communicate the potential benefits of improving adolescents' diets.

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**THEME/SUB THEME 4:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**TITLE:** Eating patterns and micronutrient intake among self- and non-self-catering female undergraduates living in residential halls

**Odionu, B.C.[1]; Umeakuka, C.C.[1]*; Onodugo, N.G.[1]; Ibeanu, V.N.[1]**

[1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.

*Corresponding author: Umeakuka.chiamaka@unn.edu.ng; +2348130007158

**Keywords:** dietary patterns; micronutrient intake; female undergraduates; self-catering

**HIGHLIGHTS**

- Most students consumed cereals but few consumed fruits and dairy.
- Meal skipping was more common among self-catering students.
- Low and very low micronutrient intake predominated in both groups.

**BACKGROUND AND OBJECTIVES**

Female undergraduates living in residential halls may experience irregular eating patterns because of academic schedules, food access, catering arrangements and the degree of control they have over food preparation. Dietary diversity is important because diets that contain a wider range of nutrient-dense food groups are more likely to provide adequate micronutrients (1,2). Evidence from Nigerian universities has also documented meal skipping, low intake of selected food groups and inadequate dietary diversity among students (3–5). However, limited attention has been given to whether catering arrangement is associated with dietary patterns and micronutrient intake among female undergraduates living in residential halls. This study therefore compared eating patterns and micronutrient intake between self-catering and non-self-catering female undergraduates.

**MATERIALS AND METHOD**

A cross-sectional study was conducted among 484 female undergraduate students living in residential halls of a federal university in Enugu State, Nigeria. Data were collected using a structured questionnaire and 24-hour dietary recall. Information on meal frequency, meal skipping, cooking frequency and source of food was obtained from the questionnaire. Dietary diversity was derived from the 24-hour recall and compared with reference standards. Data were analysed using SPSS version 23.0 and summarised using frequencies, means and percentages. Chi-square test was used to assess associations between categorical variables at a 95% confidence level, with $p<0.05$ considered statistically significant.

**RESULTS AND DISCUSSION**

The respondents' diets were dominated by cereals (95.04%), while consumption of legumes (29.96%), dairy (39.26%) and fruits (14.26%) was relatively low. Meal skipping was more prevalent among self-catering students (86.05%) than non-self-catering students (75.84%), and the majority of respondents consumed two meals daily. Overall micronutrient intake was classified as moderate in 2.07%, low in 69.21%, very low in 26.45% and high in 2.27% of respondents. Cooking frequency, meal frequency, meal skipping and source of food were

significantly associated with micronutrient intake ($p<0.05$), whereas amount spent on food was not statistically significant.

**Table 1.** Selected dietary and micronutrient-intake findings among respondents

| Variable | Frequency | Interpretation |
|---|---|---|
| Cereal consumption | 95.04% | Diet was strongly cereal-based |
| Legume consumption | 29.96% | Suboptimal intake |
| Dairy consumption | 39.26% | Suboptimal intake |
| Fruit consumption | 14.26% | Low intake |
| Meal skipping | 86.05% self-catering; 75.84% non-self-catering | More common among self-catering students |
| Micronutrient intake | 69.21% low; 26.45% very low | Inadequate intake predominated |

The cereal-dominant pattern and low consumption of fruits, dairy and legumes suggest limited dietary diversity and may help explain the predominance of low and very low micronutrient intake. This pattern is consistent with previous Nigerian university studies reporting meal skipping and inadequate intake of several food groups among undergraduates (3,4). More recent evidence indicates that dietary diversity can be useful for identifying diets with greater likelihood of micronutrient adequacy among adolescents (2). The stronger occurrence of meal skipping among self-catering students suggests that having responsibility for food preparation does not necessarily translate into regular meal consumption.

## CONCLUSION AND RECOMMENDATIONS

Female undergraduates living in residential halls had predominantly cereal-based diets, low consumption of several micronutrient-rich food groups and a high prevalence of low or very low micronutrient intake. Meal skipping was particularly common among self-catering students. Universities should strengthen practical nutrition education for students, promote regular meal consumption and dietary diversity, and improve access to affordable fruits, legumes, dairy and other nutrient-dense foods within or around residential halls.

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**Theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, and Sectors.
**Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors and Opportunities of an overlooked Life Stage
**Title**: Association between beverage consumption patterns and cardiovascular disease risk factors among undergraduate students in Abeokuta.
**Authors:** *Ilesanmi, M.A and Akinbule O.O.
**Affiliation**: Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.
*Corresponding author, morenikeji.ilesanmi2019@gmail.com, +2348168829356
**Keywords**: Beverage consumption, cardiovascular disease, risk factors, undergraduate students.
**Highlights**
• Twenty-one percent of respondents had hypertension.
• Carbonated and energy drinks were the most consumed beverages.
• Significant associations were found between routine commercial beverage intake and shifting anthropometric measures ($p < 0.05$).

## BACKGROUND AND OBJECTIVES
Cardiovascular diseases (CVDs) represent an escalating global public health threat, with shifting lifestyle patterns and increasing commercial beverage intake driving early metabolic risks among young adults [1]. Undergraduate students are particularly vulnerable, as they frequently adopt poor dietary habits, including high consumption of sugar-sweetened beverages (SSBs) [2]. This study assessed the association between beverage consumption patterns and cardiovascular disease risk factors among undergraduate students in Abeokuta, Ogun State, Nigeria

## MATERIALS AND METHOD
A cross-sectional design was used. A total of 308 undergraduate students was randomly selected across university levels. Data on beverage consumption pattern, alcohol drinking status, and medical history were obtained using adapted validated questionnaires. Anthropometry and blood pressure were measured using standard clinical protocols. Data were analyzed using descriptive and correlation analyses at $p < 0.05$.

## RESULTS AND DISCUSSION
### Socio-demographic and beverage consumption patterns of the respondents
More than half (55.8%) of the respondents were females, 95.1% were within the age-range of 18-24year, 50.0% reported receiving less than ₦25,000 as monthly stipends and 21.0% were hypertensive. The study revealed consumption of sugar-sweetened beverages among the respondents with carbonated and energy drinks constituting the most frequently consumed beverage categories. Sachet water was the most consumed beverage daily (96.8%), while Coca-Cola, Fearless energy drink, and Maltina were frequently consumed, 16.6% were overweight. Chi-square analysis showed that 7up had significant associations with hypertension status ($p = 0.02$) and abdominal obesity ($p = 0.00$).

**Risk factors for cardiovascular diseases among the respondents**

Fig. 1 below shows the hypertension status of the respondents, in which 59.10% were not hypertensive, however, 18.80% and 4.3% had hypertension stage 1 and 2, respectively.

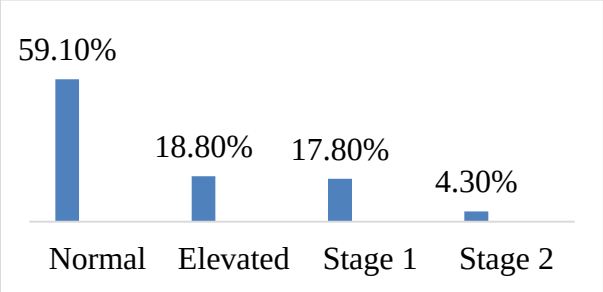



**Fig 1: Hypertension Status of the respondents**

**Association of beverage consumption patterns and risk factors for cardiovascular diseases**

Inferential analysis established a significant association between regular beverage consumption patterns and overweight ($p < 0.05$), signaling an early onset of modifiable CVD risks among the student population. These findings directly correspond with localized data indicating a high prevalence of beverage reliance among tertiary students in Abeokuta, where carbonated drink choices heavily dictate early metabolic shifts and abdominal obesity risks [2,3].

**CONCLUSION AND RECOMMENDATION(S)**

Undergraduate students in Abeokuta exhibit clear modifiable cardiovascular disease risk factors, notably hypertension, which are significantly associated with their beverage consumption patterns. There is an urgent need for institutional wellness policies, routine on-campus cardiovascular screenings, and targeted nutritional education programs led by registered dietitians to promote healthier beverage alternatives and mitigate future CVD burdens among young adults.

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**SUB THEME: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

# Anthropometric Characteristics, Perceived Health Status, Prostate Cancer Knowledge and Risk Factors among Male Artisans in Ogun State, Nigeria

***[1]Ilori O.A, [2]Uthman-Akinhanmi Y.O., [3]Adeosun F. , [4]Ilo J.G, [5]Ngozi E.O, [6]Ifebajo A.Y, [7]Onabajo-Omilani T.O, [1]Onaolapo T.T, [1]Olatunji T.J, [1]Lam F.J, and [1]Durojaye A.A***

*[1]Department of Nutrition and Dietetics, Moshood Abiola Polytechnic Abeokuta, Ogun State*
*[2]Department of Home Science and Hospitality Management, Nutrition and Dietetics Unit, College of Agricultural Science, Olabisi Onabanjo University Ago-Iwoye, Ogun State, Nigeria*
*[3]Department of Nutrition and Dietetics, Federal University of Technology, Ilaro Ogun State*
*[4]Department of Nutrition and Dietetics, Federal University of Medical Science, Abeokuta*
*[5]Department of Human Nutrition and Dietetics, School of Allied Health Sciences, Babcock University, Ilisan Ogun State Nigeria*
*[6]Home Economics, Federal College of Education, Akoka, Lagos State*
*[7]Department of Nutrition and Dietetics, Ogun State Polytechic of Health and Allied Sciences, Ilese. Ogun State Nigeria.*

***Corresponding author;** ilori.olasunmbo@mapoly.edu.ng; OR iloriolasunmbo@gmail.com*

***Keywords: Prostate cancer, Artisans, Anthropometry, Lifestyle factors, Screening behavior, Nigeria***

**Background and objective:** Prostate cancer remains the second most frequently diagnosed malignancy among men globally and a leading cause of cancer-related mortality, particularly in low- and middle-income countries where late presentation is common. This study assessed anthropometric characteristics, perceived health status, and prostate cancer risk factors among apparently healthy male artisans in Ogun State, Nigeria.

**Methodology:** A descriptive cross-sectional design was employed involving 2,000 apparently healthy male artisan (welder, carpenter, bricklayer, etc) selected through a multistage sampling technique across the three (3) senatorial districts of Ogun state. Data were collected using a validated structured questionnaire capturing socio-demographic characteristics, lifestyle practices, knowledge, attitudes, and screening behaviors, alongside anthropometric measurements including height, weight, and Body Mass Index (BMI) following standard protocols. Self-Rated Health (SRH) single question tool rated from Excellent to Poor was used. Data were analyzed using SPSS version 25, with descriptive and inferential statistics at $p < 0.05$ significance level.

**Result and Discussion:** The mean age of respondents was 31.4 ± 8.6 years, with 34.2% within 25–34 years. Despite relatively high educational attainment of secondary and tertiary education (63.5%), only 18.7% had ever undergone prostate cancer screening. Awareness of prostate cancer was moderate (58.9%), while comprehensive knowledge remained low (35.4%). Major barriers to

screening included low perceived susceptibility, financial constraints, and fear of diagnosis. Anthropometric findings revealed that 21.8% were overweight and 12.6% obese, indicating a substantial burden of modifiable risk factors. Lifestyle assessment showed frequent consumption of red and processed meat (62.3%), alcohol use (54.7%), and inadequate sleep patterns (47.5%), most of these risk factors which may predisposes them to prostate cancer as male above age 40. Although over half (52.8%) rated their health as good or excellent, this perception did not significantly influence screening uptake ($p>0.05$).

**Table 1: Knowledge of Prostate Cancer among Male Artisan in Ogun state**

| Variables | Frequency | Percentage (%) | p-value |
|---|---|---|---|
| Ever heard of Prostate cancer | 690 | 34.5 | 0.000 |
| Risk factor (older age) | 760 | 38 | 0.001 |
| Family history of Prostate cancer | 340 | 17 | 0.021 |
| Recent family suffering from Prostate cancer | 220 | 11 | |
| Prostate cancer cannot be treated | 660 | 32.5 | |
| No prostate cancer screening | 1700 | 85 | 0.005 |
| Prostate cancer can be inherited | 1160 | 58.0 | |

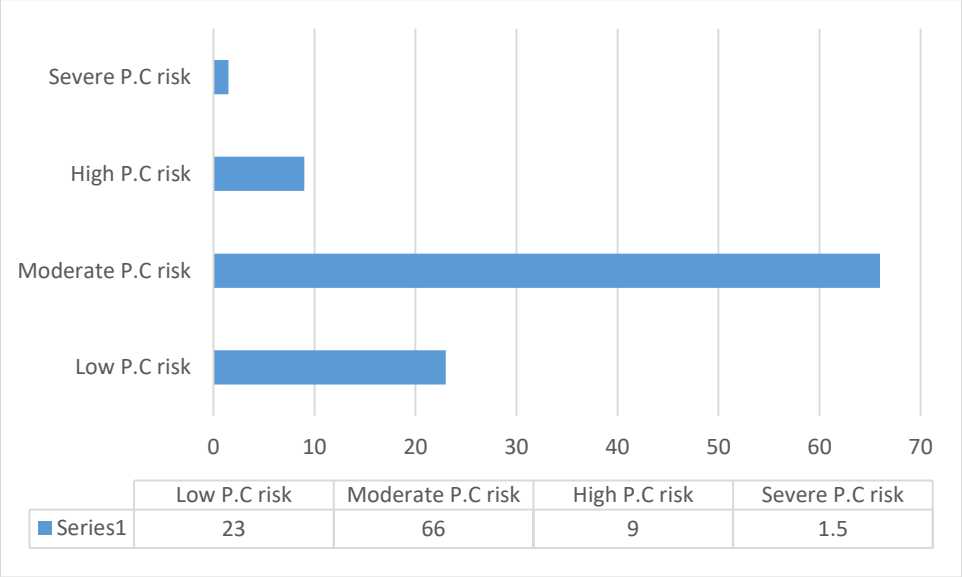



**Figure 1: Prostate Cancer Risk Rating of the Respondents**

**Conclusion:** The study concludes that despite relatively good perceived health status, screening uptake among artisans was low and modifiable lifestyle risk factors are prevalent.

**Recommendation:** Targeted health education, workplace-based screening interventions, and subsidized diagnostic services are recommended to enhance early detection and reduce prostate cancer burden in this population.

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Theme/sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage Precision

# BEYOND BODY MASS INDEX: CARDIOVASCULAR RISK AND DIETARY INEQUALITIES AMONG IN-SCHOOL ADOLESCENTS IN OSOGBO, SOUTHWESTERN NIGERIA

**Oyewo, I.O.[1]*; Omolade, O.E.; Afolabi, O.; and Okijiola, A.H**

[1]Department of Human Nutrition and Dietetics, University of Ilesa, Ilesa, Osun State, Nigeria.

*Corresponding author, e-mail: ibukun_oyewo@unilesa.edu.ng, +2348062602781

Keywords: Adolescent obesity, Waist-to-hip ratio, Dietary habits, Nigeria

## Highlights

- 98.3% of adolescents had normal BMI-for-age.
- Private school students had significantly higher cardiovascular risk (17.4%).
- Socioeconomic status drives disparities in dietary diversity and central adiposity.

**BACKGROUND AND OBJECTIVES:** Adolescent obesity is an escalating public health concern in low- and middle-income countries such as Nigeria, driven by urbanization and dietary transitions (1). Despite the associated risk of chronic diseases, adolescents are often overlooked in local health planning (2). Socioeconomic background and school environment may influence dietary exposure and cardiovascular risk patterns among adolescents (3,4). This study therefore assessed cardiovascular risk and dietary inequalities among adolescents attending public and private secondary schools in Osogbo, Osun State, Nigeria.

**MATERIALS AND METHODS:** A descriptive cross-sectional study was conducted among 345 in-school adolescents aged 10–19 years selected through a multistage sampling technique from public and private secondary schools in Osogbo metropolis. Data on socio-demographic characteristics and dietary habits were collected using semi-structured questionnaires. Anthropometric measurements including height, weight, waist, and hip circumferences were obtained using standard procedures. Body Mass Index (BMI)-for-age z-scores were computed using WHO AnthroPlus software, while cardiovascular risk was assessed using waist-to-hip ratio (WHR). Data were analyzed using SPSS version 25, with chi-square tests applied at $p < 0.05$.

**RESULTS AND DISCUSSION:** The majority of respondents (98.3%) had normal BMI-for-age, with no significant difference observed between public and private school students ($p = 0.105$). However, 10.1% of adolescents were at risk of cardiovascular disease based on WHR, with significantly higher risk among private school students (17.4%) compared to public school students (2.9%) ($p < 0.05$). Dietary patterns also differed significantly by school type. Private school students reported higher consumption of fruits, vegetables, meat, fish, milk products, and

processed foods, whereas public school students relied more on roots and tubers. These findings suggest that BMI alone may mask underlying cardiovascular risk among adolescents, particularly within higher socioeconomic school settings (5).

**Table 1: Body Mass Index (BMI) and Cardiovascular Risk (WHR) of Adolescents (10–19 years) in Private and Public Schools**

| Variable | Private (%) | Public (%) | Total (%) | p-value |
|---|---|---|---|---|
| **Normal BMI** | 166 (96.5) | 173 (100.0) | 339 (98.3) | 0.105 |
| **Overweight BMI** | 4 (2.3) | 0 (0.0) | 4 (1.2) | - |
| **WHR Risk** | 30 (17.4) | 5 (2.9) | 35 (10.1) | 0.000 |

**Table 2: Frequency of Food Group Consumption Among Adolescents by School Type**

| Food Group | Private (%) | Public (%) | p-value |
|---|---|---|---|
| **Fruits & Vegetables** | 79 (45.9) | 60 (34.7) | 0.000 |
| **Meat & Fish** | 70 (40.7) | 40 (23.1) | 0.001 |
| **Roots & Tubers** | 40 (23.3) | 57 (32.9) | 0.000 |
| **Cereals** | 64 (37.2) | 94 (54.3) | 0.004 |
| **Fat** | 80 (46.5) | 30 (17.3) | 0.000 |
| **Milk Products** | 48 (27.9) | 25 (14.5) | 0.000 |
| **Process foods & beverages** | 63 (36.6) | 20 (11.6) | 0.000 |

**CONCLUSION AND RECOMMENDATION:** Although BMI-defined obesity was low among the adolescents, significant disparities existed in dietary patterns between the school types. Adolescents attending private schools showed higher cardiovascular risk despite having normal BMI-for-age. Routine screening using cardiovascular indicators beyond BMI, alongside school-based nutrition education and promotion of healthy dietary practices, is therefore recommended.

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**Conference Sub-theme**: **Adolescent Nutrition and Health: Characteristics, Risk, Factors, and Opportunities of an Overlooked Life Stage**

**Title:** Comparative analysis of phytochemical and antioxidant potential of some commonly consumed herbs (clove, black seed and doum palm) among university students within Kaduna state, Nigeria

**Name of Authors**: Rabiu Azeeb Olanrewaju[1], Abbas Olagunju[1]*, Ibrahim Nafisat[1], Mani M. Bala[1], Hafsat A. Muhammad[1], Olumuyiwa A Owolabi[1] and Ijeoma Okolo[1],

**Affiliation of Author (s):** [1]Nutrition Unit, Department of Biochemistry Ahmadu Bello University Zaria, Nigeria.

*Corresponding author e-mail: Email: nutribas@gmail.com , +23408038534580

**Keywords:** Clove, Black seed, Doum palm, Phytochemical, Antioxidants, Students

**Background and Objectives;** Herbs such as clove, black seed, and doum palm are widely consumed in Nigeria for culinary, medicinal, and nutritional purposes. Their phytochemical composition and antioxidant potential are of growing interest due to their role in disease prevention and health promotion (1, 2). This study aimed to assess consumption patterns, knowledge, and perceptions of these herbs among university students, and to compare their phytochemical and antioxidant properties using standard assays.

**Materials and Methods:** A structured questionnaire was administered to 400 students of Ahmadu Bello University, Zaria, stratified into 10 faculties and randomly selected to collect socio-demographic data, consumption behaviors, and knowledge of health benefits using WHO standards. Qualitative and quantitative phytochemical screening was conducted on aqueous and ethanolic extracts of herbs. Antioxidant activity was assessed via DPPH radical scavenging assay and FRAP reducing power assay, with ascorbic acid as the standard reference.

**Results:** Table 1. Socio-Demographic Information of Students

| Variable | Categories | Percentage |
|---|---|---|
| **Gender** | Male | 55.2% |
| | Female | 44.8% |
| **Age (years)** | <18 | 12% |
| | 18–22 | 63% |
| | 23–26 | 23.9% |
| **Religion** | Islam | 51.8% |
| | Christianity | 48.2% |
| **Ethnicity** | Hausa | 37.1% |
| | Yoruba | 23.3% |
| | Igbo | 6% |
| | Others | 33.6% |

Table 2. Consumption Pattern of Cloves, Doum and Black Seed Among Students

| | |
|---|---|
| **Most Consumed Herb** | **Clove (54.0%), Doum palm (27.4%), Black seed (18.6%)** |
| **Frequency of Herb Consumption** | Rarely (61.7%), Monthly (21.7%), Weekly (12.2%) Daily (4.3%) |
| **Purpose of Herb Consumption** | Medicinal (62.3%), Taste/Aroma (51.8%), Nutritional (26.3%) |
| **Source Herbs** | Local herb store (67.3%), Family/Friends (37.2%) |

Phytochemical analysis revealed that clove had the highest phenolic content (7.25 mg GA/g aqueous extract; 6.82 mg GA/g ethanolic extract), while black seed contained the highest terpenoids (2.96 mg USA/g aqueous extract; 3.19 mg USA/g ethanolic extract). Antioxidant assays showed strong radical scavenging activity across all herbs, with doum palm aqueous extract exhibiting the highest DPPH activity, and clove demonstrating superior FRAP reducing power due to its phenolic richness. This revelation is in line with findings of Parham *et al*., (3) in their review of antioxidant, antimicrobial and antiviral properties of herbal materials

**Conclusion**

University students in Kaduna consume clove, black seed, and doum palm primarily for medicinal and flavor purposes, with clove being the most popular. Phytochemical screening confirmed the presence of phenolics, terpenoids, tannins, and flavonoids. Antioxidant assays demonstrated their significant potential in promoting health and preventing oxidative stress-related conditions. Nutrition education and awareness campaigns could further enhance informed consumption of these herbs among young adults.

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**Sub-theme:** Adolescents Nutrition and Health: Characteristics, Risk, Factors and Opportunities of an Overlooked Life Stage.

**Topic:** Dietary Intake and Nutritional Status of Secondary School Adolescents in Southwest Nigeria

**Name of Author (s):** [1*]Omotoye F.E., [2]Ajayi K., [2]Dada I.O., [3]Igbokwe D.O., [3]Fabusuyi O.D.

**Affiliation of Author (s):** [1]Department of Food Science and Nutrition, Ekiti State University, Ado Ekiti, Nigeria

[2]Department of Human Nutrition and Dietetics, Afe Babalola University Ado Ekiti, Ekiti State, Nigeria. P.M.B 5454

[3]Department of Nutrition and Dietetics, College of Health Sciences and Technology Ijero, Ekiti State, Nigeria

*Corresponding author: funmilayo.omotoye@eksu.edu.ng; +2348039575579

**Keywords**: Adolescents, Dietary intake, Nutritional status, Secondary schools

**Highlights**

- Adolescents attending private schools exhibited significantly better nutritional outcomes
- Poor dietary patterns heavily dominated by cereals, inadequate consumption of fruits, vegetables, and animal Protein, predisposing adolescents to micronutrient deficiencies.
- Insufficient energy and protein intake emerged as key contributors to under-nutrition.

**BACKGROUND AND OBJECTİVES:**

Adolescence is a critical stage for growth and development that requires adequate nutrition (1). However, adolescent nutrition remains insufficiently prioritized in global health policies (2). This study compared the nutritional status and dietary intake of adolescents attending public and private secondary schools in Ido–Osi Local Government Area, Ekiti State, Nigeria, to identify differences and nutritional challenges.

**MATERIALS AND METHOD:**

A descriptive cross-sectional study was conducted among 501 adolescents aged 10–19 years selected through multistage sampling from public and private day secondary schools. Data were collected using structured questionnaires, 24-hour dietary recall, food frequency questionnaires, and anthropometric measurements. Nutritional status was assessed using WHO BMI-for-age z-scores. Data were analyzed with SPSS version 26 using descriptive and inferential statistics.

**RESULTS AND CONCLUSION:**

Among 501 adolescents (mean age 13.53±2.01 years), stunting, underweight, and overweight prevalence were 23.8%, 11.6%, and 0.6%, respectively. Under-nutrition was significantly higher among public-school students than private-school students ($p<0.05$). Diets were dominated by cereals and sugary snacks, with low fruit, vegetable, and animal-protein consumption. Nutritional status was significantly associated with nutrient intake ($p<0.05$), highlighting the need for school-based nutrition interventions

Table 1 Mean 24hours Nutrient intake of the adolescents by type of school and age

| | | | 10-14Yrs | | 15-18yrs | | |
|---|---|---|---|---|---|---|---|
| Nutrient | Public | Private | Male | Female | Male | Female | P-value |
| Calorie (kcal) | 777.2 ±706.2 | 2121.6 ±734.0 | 1993.8 ±687.9 | 1992.2 ±753.4 | 2202.9 ±749.0 | 1855.1 ±571.4 | 0.01* |
| Protein (g) | 68.3 ±33.7 | 78.1 ±35.4 | 71.0 ±35.2 | 70.0 ±35.1 | 72.6 ±35.3 | 68.8 ±29.6 | 0.90 |
| Carbohydrate (g) | 354.5 ±131.9 | 356.2 ±135.1 | 351.3 ±128.2 | 352.7 ±138.3 | 400.4 ±135.9 | 324.7 ±108.8 | 0.00* |
| Fat (g) | 35.4 ± 19.0 | 41.2 ±17.7 | 37.4 ±18.8 | 36.6 ±17.8 | 38.0 ±21.9 | 34.7 ±17.9 | 0.70 |
| Fiber (g) | 8.9 ±11.1 | 11.1 ±12.2 | 7.3 ±8.5 | 10.4 ±13.3 | 11.3 ±11.4 | 8.8 ±11.9 | 0.03* |

**CONCLUSION AND RECOMMENDATION**

This study identified a double burden of malnutrition among adolescents in South-West Nigeria, with private-school students showing better nutritional status. Calorie intake of females was significantly lower than the males in both early and late adolescent groups. Diets were dominated by cereals, fast foods, and soft drinks, with low fruit, vegetable, and animal-protein intake, increasing nutrient deficiency risks. Targeted nutrition education, improved school feeding, dietary diversification, routine screening, and supportive policies are needed.

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**Theme/sub-theme:** Adolescents Nutrition and Health: Characteristics, Risks factors and opportunities

**Title**: Comparative Study of the Nutritional Status and Diet Quality of Adolescents in Selected Government-owned and Private Boarding Schools in Ogun State.

**Author (s)**: *Enidunni Similoluwa A. [1], W.A.O Afolabi[2], Akinsanya O.B[1], and Adewale I.O. [1]

**Author (s) Affiliation**: [1]Department of Food Science and Technolgy, Nutrition and Dietetics Unit, Bells University of Technology, Ota

[2]Department of Nutrition, Federal University of Agriculture Abeokuta.

***Corresponding author's e-mail address:** enidunnisimiloluwa@gmail.com

**Keywords:** Adolescents, Public schools, Private schools, Boarding school.

**Background and objective**: Unhealthy dietary practices has been associated with malnutrition, especially in adolescents (1). Understanding the quality of diet consumed by adolescents is essential to reducing the burden of malnutrition (2). This study assessed and compared the nutritional status and diet quality of adolescents in selected government- and private-owned boarding schools in Ogun State.

**Methodology:** This study was a cross-sectional study conducted in selected private and government-owned secondary schools with boarding facilities in Ogun State. A total of 248 adolescents were selected from 5 public and 3 private secondary schools using simple random sampling. Data on socio-demographic characteristics, food consumption pattern, diet quality and nutrient intake were obtained using semi-structured, food frequency, diet quality and 24-hour dietary recall questionnaires, respectively. Nutrient intake and anthropometric data were analyzed using a Total Diet Assessment and Anthro-plus softwares, respectively. Nutrient intake adequacy was assessed using standard procedure. Data were presented using frequencies, percentages, and median. Independent t-test, Chi-square and correlation analysis were done to test for association among variables at $p<0.05$.

**Results**:

**Socio-demographic and food consumption pattern of the respondents**
Results showed that about 45.2% of the adolescents were male respondents, 64.9% were within 15 – 18 years of age. Compared to private school adolescents, public schools adolescents consumed more pulses (53.7%), whole grains (4.9%), deep fried food (50.4%), eggs (44.7%), processed ultra-packaged snacks (44.7%) and fruits (38.2%) 1-2 times weekly while private schools adolescents consumed more of fast foods (23.2%), dark leafy vegetables (96%), nuts and seeds (61.6%), milk (44.8%) and red meat (62.4%) 1-2 times weekly.

**Nutrient intake adequacy of the respondents**
There were significant ($p = 0.000$) differences in the micro- and macronutrient intakes of the public and private school adolescents. Also, there were significant ($p<0.05$) differences in the nutrient intake adequacy of public and private school adolescents except in vitamin A intake ($p = 0.042$). An higher population of public schools adolescent consumed inadequate daily amount fiber (91.9%), vitamin A(22.8%), calcium (98.4%), phosphorus(108%), sodium (45.5%), potassium

(89.4%) and magnesium (95.9%), with most consuming less than 60% of recommended dietary allowance

In regards to nutrient intake and RDA, the public school's adolescents consumed less energy and nutrients than the adolescents in private schools. This finding are however different to those reported by Nicholaus *et al*., (3), who reported a higher percentage of private school adolescents meeting less than the recommended dietary allowance

**Anthropometric measurements of the respondents**

There were no significant ($p<0.05$) difference in the body mass index of public and private schools adolescents, however underweight (1.2%), overweight (13.8%) and Obesity (1.6%) were more prevalent in public school adolescents. Similarly, waist circumference and waist-hip ratio significantly ($p<0.05$) differed among public and private schools.

**Diet Quality of the respondents**

Diet quality was assessed following the global diet quality project's diet quality indicators. There were no significant ($p<0.05$) difference between the Global Dietary recommendations (GDR),Non-Communicable-Risk(NCD-Risk), Non-Communicable-Protect (NCD-Protect) and Dietary Diversity scores (DDS) of public and private school adolescents. In terms of GDR, DDS and NCD-risk scores, public schools adolescents have a better diet quality than private school adolescents, however, in terms of NCD-Protect score both types of schools scored low meaning that both type of schools consumed a low range of global dietary recommended "healthy" food groups(5). In addition, private schools adolescents achieved minimum dietary diversity (84%) nut and seed consumption (49%), sweet food (99%) and soft drink consumption (44%) compared to public school adolescents. There was low fruit consumption by adolescents in public and private schools.

**Table 1: Comparison of Selected Diet Quality Indicators between Public and Private schools Respondents**

| Indicator | Government-owned | Private-owned | Range | t | p-value |
|---|---|---|---|---|---|
| GDR | 9.4 | 9.0 | 0-18 | 0.120 | 0.904 |
| NCD-Risk | 2.5 | 2.9 | 0-9 | -2.504 | 0.13 |
| NCD-Protect | 2.9 | 2.9 | 0-9 | -2.940 | 0.13 |
| DDS | 5.8 | 5 | 0-10 | -2.487 | 0.14 |

**Influence of socio-economic, socio-demographic characteristics and nutrient intake on the diet quality and nutritional status of respondents.**

Private schools adolescents showed a significant relationship ($p\leq 0.05$) between Waist to Hip ratio and nutrient intake and no significant relationship between ($P \leq 0.05$) other variables, while for public schools adolescents a significant relationship ($P \leq 0.05$) was seen between BMI-For-Age and nutrient intake and Waist to Hip ratio and nutrient intake and no significant relationship ($p< 0.05$) between other variables.

**Conclusion**: Unhealthy diet and overweight were prevalent among the adolescents in public and private schools. Low fruit and nut intakes may put adolescents at risk of micronutrient deficiency. Interventions targeted at improving diet quality and reducing body weight is essential to promote the health of in-school adolescents in the study area.

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**THEME:** Delivering Better Nutrition for All: Connecting the Dots across Life Cycle, Systems & Sectors

**SUB-THEME:** Adolescent Nutrition and Health: Characteristics, Risk Factors and Opportunities of Overlooking Life stage

**TITLE:** Obesity, Weight Loss Intention and Food Consumption Pattern among Female Undergraduate Students in Ondo State, Nigeria

**NAME OF AUTHOR:** Olotu, O.B and Olaitan, O.O.

**AFFILIATION:** Department of Human Nutrition and Dietetics, University of Medical Sciences, Ondo, Ondo State, Nigeria

**Email and phone number:** olotuope2020@gmail.com, +2349063926265

**KEYWORDS:** Obesity, Food Consumption Pattern, Female Undergraduates, Nutrition

HIGHLIGHTS

- Obesity prevalence among respondents was 8.2%.
- More than half (65.5%) of respondents consumed fast foods regularly.
- A substantial proportion of students skipped breakfast and engaged in unhealthy dietary practices.
- Physical activity was associated with better weight outcomes among respondents.

**BACKGROUND AND OBJECTIVES:** The rising case of overweight and obesity among young adults has become a major public health concern globally [1]. Body image perception is a crucial experience especially among young female folks, and this shapes their dietary behavior [2]. However, unhealthy dietary habits, obesogenic food environment and sedentary lifestyle could predispose university students to obesity [3]. Understanding lifestyle practices and food consumption patterns among female undergraduates is essential for designing effective nutrition interventions for young individuals. This study assessed prevalence of obesity and its association with weight loss intention and food consumption pattern among female undergraduate students.

**MATERIALS AND METHODS**: A cross-sectional study was conducted among 267 female undergraduate students and selected using simple random sampling from the two universities, from the University of Medical Sciences (UNIMED) and Adeyemi Federal University of Education (AFUED) in Ondo State. A structured questionnaire was developed to obtain information on socio-demographic characteristics and lifestyle practices, while dietary pattern and Anthropometric measurements (weight and height) were obtained using standard procedures, and Body Mass Index (BMI) was calculated as weight (kg)/height ($m^2$) and food frequency questionnaire. Obesity was defined according to WHO criteria as BMI $\geq$30.0 kg/$m^2$. Statistical Package for Social Sciences 29.0 was used for data analysis at 5% level of significance ($p< 0.05$).

**RESULTS AND DISCUSSION:** Participants' mean age was 19.7±2.69 years. Proportion of those who received ₦40 000 and above as monthly stipends was 46.8%. Overweight, obesity and intention of losing weight accounted for 16.1%, 8.2% and 28.8%, respectively. More than half (65.5%) consumed fast foods regularly, 44.2% regularly consumed breakfast, 39.7% ate more

when stressed, while 18.0% regularly performed physical activity. Obesity was associated with monthly income ($X^2$= 6.490, p=0.039) and intention to lose weight ($X^2$= 38.65, p=<0.001). Poor breakfast intake and regular consumption of snacks (which are mostly processed foods), meal skipping, stress-related eating, and limited dietary diversity have been identified as lifestyle factors influencing the risk of obesity [4]. Gender and income play major roles in the incidence [5]. The findings of this study underscore the influence of dietary behaviour and lifestyle choices on nutritional status among young women in tertiary institutions.

**CONCLUSION AND RECOMMENDATIONS**: Obesity and intention to lose weight exist among female undergraduate students, and income, physical activity and dietary lifestyle choice play major roles. Nutrition education programs, promotion of regular physical activity, and availability of healthy food options within university environments are recommended to support better nutrition outcomes among university students in Nigeria.

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**Conference Theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage.**

**Tittle:** Knowledge, Awareness and Practice of Folic Acid Supplementation among Women of reproductive age in Kubwa District Area of Abuja Using the Socio-Ecological Model

***Oyelowo A.O.[1,2], Olagunju A.[1], Jiyah, F.M.[3]**

[1]Department of Biochemistry, Ahmadu Bello University, Zaria, Nigeria.

[2]Management System Certification Department, Standards Organisation of Nigeria.

[3]Department of Urban and Regional Planning, Federal Polytechnic Bida, Nigeria.

***Corresponding Author,** abigailoyelowo@gmal.com; +2348065522302

**Keywords:** Women of reproductive age, Socio-ecological factors, Folic Acid

**Background and objectives:** Women of reproductive age have increased requirements for certain vitamins and minerals due to the additional physiological demands of menstruation, pregnancy, and lactation [1]. Several factors have been shown to influence Knowledge, Awareness and Practice (KAP) of folic acid supplementation [2]. Periconceptional Folic Acid intake in Nigeria is poor among women and certain group of women are less likely to know about the role of FA in the prevention of birth defects [3]. Based on The Social Ecological Model (SEM) of Urie Bronfenbrenner, this study determined the association between socio-ecological factors and KAP level of folic acid supplementation among women of childbearing age in Kubwa District Area of Abuja

**Materials and methods:**

A descriptive cross-sectional study was conducted among women of reproductive age across Kubwa District Area. Using A two-stage cluster sampling Technique, 96 women who met the inclusion criteria were recruited from two main markets, and two each of both Christian & Islamic religious groups. Data was collected using an interviewer/self-administered anonymous questionnaire consisting of 31 questions. Questionnaire was designed with tailored multi-level data using individual, interpersonal, organizational and community components of Socio-Ecological Model [4]. Data was coded and analyzed using SPSS version 25. Descriptive statistics was used to summarize variables, while Pearson and Chi-square tests were used to assess associations between socio-ecological factors and KAP level. Statistical significance was set at $p < 0.05$**.**

**Result and Discussion:** Findings from the study reveals that Pregnancy and number of live births were significantly associated with knowledge and practice of Folic acid supplementation with $p = 0.026$, 0.036 & $p= 0.001$ respectively. Additionally, age group and marital status is significantly associated with practice level. Poor practice was rated high among age group 15-19 and 20-24 while good practice was highest among age groups 30-34 and 35-39. Educational level was significantly associated with attitude level ($\chi^2 = 9.714$, $p = 0.046$), with tertiary education recording 89.2% positive attitude, secondary education 88.9%, and primary education 0.0% positive attitude. Table 2 presents the Pearson correlation coefficients between KAP scores and selected variables. Age group was significantly positively correlated with practice ($r = 0.578$, $p < 0.001$) and attitude ($r = 0.264$, $p = 0.011$), reinforcing the chi-square test finding that older women practice more consistently. Number of live births was positively correlated with both practice ($r = 0.514$, $p < 0.001$) and attitude ($r = 0.278$, $p = 0.007$), while pregnancy history showed significant negative correlations with practice ($r = -0.588$, $p < 0.001$)

**Table 1: Association between selected Socio-Ecological factors and KAP levels (n=93) of Folic Acid Supplementation among Women of Childbearing Age in Kubwa District Area of FCT**

$\chi^2$ = Chi-square statistic; *=significance at p<0.05

| Variable | Knowledge | | Practice level | | Attitude level | |
|---|---|---|---|---|---|---|
| | $\chi^2$ | p-value | $\chi^2$ | p-value | $\chi^2$ | p-value |
| **Age group (years)** | 14.861 | 0.137 | 43.404 | **.000*** | 6.354 | 0.785 |
| **Marital status** | 8.649 | 0.194 | 29.21 | **.000*** | 2.869 | 0.825 |
| **Educational level** | 6.767 | 0.149 | 8.071 | 0.089 | 9.714 | **.046*** |
| **Occupation** | 7.005 | 0.725 | 17.213 | 0.07 | 4.359 | 0.93 |
| **Religion** | 2.68 | 0.613 | 2.406 | 0.662 | 1.2 | 0.878 |
| **Ever been pregnant** | 7.307 | **0.026*** | 32.25 | **0.001*** | 1.893 | 0.388 |
| **Number of live births** | 13.515 | **0.036*** | 34.369 | **0.001*** | 3.962 | 0.682 |

**Table 2: Pearson correlation of KAP level with some Selected Socio-ecological factors (n=93) of Folic Acid Supplementation among Women of Childbearing Age in Kubwa District Area of FCT**

| Variable | Knowledge r (p) | Practice r (p) | Attitude r (p) |
|---|---|---|---|
| **Age group** | 0.084 (0.423) | 0.578** (0.000) | 0.264* (0.011) |
| **Marital status** | -0.116 (0.270) | 0.037 (0.726) | 0.067 (0.529) |
| **Educational level** | 0.151 (0.150) | 0.147 (0.163) | 0.021 (0.840) |
| **Occupation** | -0.064 (0.547) | 0.158 (0.133) | 0.084 (0.426) |
| **Religion** | -0.004199 | 0.063 (0.548) | -0.014 (0.892) |
| **Ever been pregnant** | -0.00564 | -0.588** (0.000) | -0.281** (0.007) |
| **Number of live births** | 0.170 (0.104) | 0.514** (0.000) | 0.278** (0.007) |

The association between age, marital status, Ever been pregnant, Number of live births and KAP observed in this study is consistent with previous study showing that older women and those with prior pregnancy experience are more likely to receive prenatal-care information and adopt recommended health behaviors [5]. These findings reinforce the importance of socio-ecological targeting in the design of maternal health interventions.

**Conclusion:** The study established that reproductive experience and awareness-related factors were the strongest determinants of both knowledge and practice of folic acid supplementation among the women of childbearing age in Kubwa District Area. Advanced age and married women exhibit more practice. Overall, there is a clear gap between awareness and actual practice, indicating the need for strengthened health education and improved access to folic acid supplementation services.

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Theme/Sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors and Opportunities of an Overlooked Stage

Title: Assessment of Indices of Renal Function in Undergraduates with Normal and Elevated Blood Pressures in a Nigerian University

Name of Author(s): *Ajayi, O.O[1] and Ugbenyen, AM[1]

Affiliation of Author: [1]Department of Biochemistry, Edo State University Iyamho, Edo State, Nigeria.

*Corresponding author, email: olulope.olufemi@edouniversity.edu.ng, +234-8063737930

Keywords: Elevated blood pressure, Nigerian undergraduates, renal function, cystatin C

**Highlights**

- Alkaline phosphatase was associated with elevated blood pressure.
- Hip circumference correlated with cystatin C in those with elevated blood pressure

BACKGROUND AND OBJECTIVES

Elevated blood pressure, defined as 120-139 mmHg systolic or 70-89 mmHg diastolic blood pressures is a phase in the pathogenesis of hypertension with a potential of effective intervention [1]. Its high prevalence in Nigerian undergraduates who are predominantly adolescents has been suggested. Currently, more is to be known on its association with renal function in adolescents. In this study, indices of renal function were compared between participants with normal and elevated blood pressures.

MATERIALS AND METHODS

Fifty (50) participants (29 males and 21 females) with normal blood pressure and 49 participants (28 males and 21 females) with elevated blood pressure who were undergraduate students of Edo State University Iyamho, Nigeria participated in this study. Anthropometry; bodyweight, hip (HC) and waist circumferences (WC) etc. was done. Serum from 5 ml of venous blood from participants was used for the determination of uric acid, urea, gamma glutamyl transferase (GGT), albumin, alkaline phosphatase (ALP), and cystatin C. Student's t-test and Pearson correlation coefficient were used for the comparison and association of variables, correspondingly with $P<0.05$ taken as significance.

RESULTS AND DISCUSSION

Table 1. Age, Anthropometric Indices, Blood Pressure, Biochemical Indices in Participants with Normal Blood Pressure and Elevated Blood Pressure

| Indices | Normal BP (n=50) | Elevated BP (n=49). | T-Test | P |
|---|---|---|---|---|
| **Age (Years)** | 19.00±2.07 | 18.80±2.39 | 0.455 | 0.907 |
| **Anthropometric Indices** | | | | |
| **Weight (Kg)** | 71.50±11.63 | 75.57±18.79 | -1.299 | 0.010* |
| **Height (m)** | 1.73±0.08 | 1.74±0.10 | -0.251 | 0.431 |
| **Waist Circumference (cm)** | 81.70±9.01 | 83.88±13.66 | -0.938 | 0.078 |
| **Hip Circumference(cm)** | 99.80±8.64 | 101.94±13.29 | -0.952 | 0.027* |
| **Blood Pressure** | | | | |
| **SBP (mmHg)** | 106.80±10.17 | 123.02±10.71 | -7.730 | 0.291 |
| **DBP (mmHg)** | 68.42±7.99 | 77.06±12.10 | -4.201 | 0.025* |
| **Biochemical Indices** | | | | |
| **Albumin (g/dl)** | 4.90±0.89 | 4.94±0.95 | -0.233 | 0.540 |
| **Uric acid (mg/dl)** | 4.31±2.15 | 4.51±1.96 | -0.454 | 0.609 |
| **GGT (U/L)** | 9.47±7.52 | 10.06±10.42 | -0.316 | 0.436 |
| **Cystatin C (mg/L)** | 0.70±0.29 | 0.89±0.32 | -2.946 | 0.176 |
| **ALP (IU/L)** | 21.52±5.98 | 24.48±9.10 | -1.783 | 0.010* |
| **Urea (mg/dl)** | 29.62±10.77 | 21.20±10.10 | 3.920 | 0.620 |

n=number of participants, *=P value significant at less than 0.05, SBP=Systolic blood pressure, DBP=Diastolic blood pressure, GGT=Gamma glutamyl transferase, ALP= Alkaline phosphatase.

Table 2: Association among Anthropometric and Biochemical Indices in Participants with Normal and Elevated Blood Pressures

| | **Elevated Blood Pressure** | | | | **Normal Blood Pressure** | | |
|---|---|---|---|---|---|---|---|
| **Index** | Index | r | p | Index | Index | r | p |
| **WC** | GGT | 0.338 | 0.022* | | GGT | 0.145 | 0.319 |
| **HC** | Cystatin C | 0.435 | 0.003* | HC | Cystatin C | 0.115 | 0.456 |
| **Albumin** | Cystatin C | 0.300 | 0.045* | | Cystatin C | 0.111 | 0.473 |
| **Uric acid** | Cystatin C | 0.129 | 0.398 | | Cystatin C | -0.349 | 0.020* |
| **GGT** | Cystatin C | -0.112 | 0.462 | GGT | Cystatin C | -0.301 | 0.047* |
| **Cystatin C** | Urea | -0.698 | 0.000* | Cystatin C | Urea | -0.354 | 0.018* |

*=P value significant at less than 0.05. HC=Hip Circumference, WC=Waist circumference, GGT: Gamma glutamyl transferase,

ALP was significantly higher in participants with elevated than normal blood pressure. Vascular calcification induction which has been implicated in the dysfunction of the endothelium as well as ALP's interplay with inflammatory cytokines are plausible mechanisms [2]. Significant positive associations of WC with GGT in participants with elevated blood pressure could be attributed to

oxidative stress [3]. The positive association of HC with cystatin C highlights the role of visceral adiposity in cystatin C production independent of its role in renal function. The association of albumin with cystatin C suggests their roles in blood pressure which may have a consequence on renal function. Association of uric acid and GGT with cystatin C may require further studies. The association of cystatin C with urea in both groups of participants may be independent of blood pressure status.

## CONCLUSION AND RECOMMENDATIONS

The direct correlation of hip circumference with cystatin C as well as waist circumference with GGT in participants with elevated blood pressure further suggests the association of visceral adiposity with renal function, particularly in adolescents.

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**Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

# Development and Testing a School-Based Nutrition Education Intervention Among Female Adolescents in Kano State, Nigeria: Findings from a Feasibility Study

Abubakar, H.A[1,2*], Shahril, M.R[1], and Mat, S.[1]

[1]Center for Healthy Aging and Wellness, Faculty of Health Sciences, University Kebangsaan Malaysia

[2]Nutrition and Dietetic Unit, Department of Biochemistry, Bayero University, Kano, Nigeria

***Corresponding author:** haabubakar.bch@buk.edu.ng; +2348034237363

**Keywords:** Adolescent girls; Nutrition education; Micronutrient intake; School-based intervention

## Highlights

• Theory-based intervention developed using the DESIGN Procedure

• Intervention achieved 100% attendance and participant retention

• Significant improvements in nutrition knowledge and micronutrient intake

## BACKGROUND AND OBJECTIVES

Adolescence is a stage of growth characterized by increased nutritional requirements and the establishment of lifelong dietary habits. However, adolescent in Nigeria frequently experience poor dietary practices, inadequate micronutrient intake, and limited nutrition knowledge, placing them at risk of malnutrition [1]. Evidence from Kano State has shown high rates of undernutrition, inadequate micronutrient intake, and widespread misconceptions regarding healthy eating practices among school adolescent girls [2,3]. Despite these challenges, few nutrition interventions targeting adolescents have been developed using systematic and theory-driven approaches. This study developed and evaluated a feasibility of school-based nutrition education intervention designed to improve healthy eating behaviours, nutrition knowledge, and micronutrient intake among female adolescents in Kano State, Nigeria.

## MATERIALS AND METHODS

The intervention was developed using the Nutrition Education DESIGN Procedure and guided by Social Cognitive Theory [4]. Evidence from a systematic review, cross-sectional survey, and focus group discussions informed the intervention content and educational objectives. A quasi-experimental feasibility study was conducted among 164 adolescent girls aged 15–18 years

recruited from two female secondary schools in Kano State. Participants were assigned to either an intervention group (n = 82) or a control group (n = 82). The intervention consisted of four interactive nutrition education sessions delivered over two weeks through lectures, discussions, demonstrations, and cooking practical. Data on nutrition knowledge, dietary practices, micronutrient intake, feasibility, and acceptability were collected at baseline, immediately post-intervention, and eight weeks follow-up. Two-way repeated measure mixed ANOVA was used to determine intervention effects.

**RESULTS AND DISCUSSION**

The intervention demonstrated excellent feasibility, with 100% attendance and retention throughout the study period. Acceptability assessment indicated that participants found the educational materials understandable, culturally relevant, and useful for improving food choices. Nutrition knowledge improved significantly among intervention participants, with a significant time-by-group interaction effect ($p < 0.001$, $\eta^2 = 0.853$) (Table 1). Significant time × group interactions were observed for several micronutrients, including iron, zinc, calcium, vitamin A, vitamin D, thiamine, riboflavin, folate and vitamin B12 ($p<0.05$), indicating that changes in intake over time differed significantly between the intervention and control groups (Table 1). Improvements in dietary practices were evident, including increased fruit and vegetable consumption, improved food preparation practices, and greater consideration of nutritional value when making food choices. These findings demonstrate the potential of theory-driven and culturally tailored school-based nutrition education programs to improve adolescent nutrition outcomes, consistent with previous intervention studies among adolescents in low- and middle-income countries [5].

**Table 1: Selected outcomes of the nutrition education intervention**

| Variable | Time Point | Group I (Intervention) Mean ± SD, n = 82 | Group C (Control) Mean ± SD, n = 82 | p-value | Partial Eta² |
|---|---|---|---|---|---|
| Nutrition Knowledge | Pre | 128.06 ± 10.16 | 123.70 ± 7.89 | <0.001 | 0.853 |
| | Follow-up | 180.48 ± 13.57 | 121.41 ± 6.57 | | |
| Iron (mg/d) | Pre | 13.11 ± 1.74 | 12.68 ± 3.11 | 0.013 | 0.028 |
| | Follow-up | 14.57 ± 1.09 | 12.90 ± 2.32 | | |
| Zinc (mg/d) | Pre | 5.70 ± 1.75 | 4.67 ± 1.35 | <0.001 | 0.053 |
| | Follow-up | 7.44 ± 1.58 | 5.28 ± 1.58 | | |
| Calcium (mg/d) | Pre | 505.78 ± 141.63 | 413.15 ± 119.79 | 0.019 | 0.024 |

| | | | | | |
|---|---|---|---|---|---|
| | Follow-up | 584.72 ± 116.06 | 437.73 ± 120.58 | | |
| Vitamin A (µg/d) | Pre | 321.79 ± 288.58 | 345.70 ±274.89 | 0.003 | 0.035 |
| | Follow-up | 491.31 ± 306.52 | 344.74 ± 289.41 | | |
| Vitamin $B_{12}$ (µg/d) | Pre | 0.53 ± 0.49 | 0.49 ± 0.51 | 0.027 | 0.023 |
| | Follow-up | 1.00 ± 0.46 | 0.70 ± 0.73 | | |
| Folate (µg/d) | Pre | 307.39 ± 65.85 | 298.09 ± 42.84 | <0.001 | 0.066 |
| | Follow-up | 351.28 ± 69.94 | 298.36 ± 74.03 | | |

## CONCLUSION AND RECOMMENDATIONS

This study demonstrates the successful development and testing of a theory-based, culturally tailored school-based nutrition education intervention for adolescent girls in Kano State. The intervention was feasible, highly acceptable, and effective in improving nutrition knowledge, healthy eating behaviours and micronutrient intake. Future studies should evaluate long-term sustainability and scalability across different regions and populations.

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**Theme/sub-theme**: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Nutritional Knowledge, Dietary Practices and Consumption Pattern of Fruits and Vegetables among In-School Adolescents in LAUTECH International College, Ogbomoso, Oyo State, Nigeria.

**Name of Author (s):** *Deniran, I.A.[1], Omitola A.B.[1], Kolapo M.A.[1] and Edegbai A.M.[1]

**Affiliation of Author (s):** [1]Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso, Nigeria.

*Corresponding Author, email: adelyemmy196@gmail.com +2348066361917

**Keywords:** Nutritional Knowledge, Dietary Practices Consumption Pattern, Fruits and Vegetables, In-School Adolescents

**Highlights:**

- Nutritional knowledge of fruits and vegetables was generally moderate
- Fruit and vegetable consumption practices were relatively satisfactory.
- Cost, availability, and quality hindered fruit and vegetable intake.

**BACKGROUND AND OBJECTİVES**

Micronutrient deficiencies remain a significant public health concern among Nigerian adolescents due to the inadequate intake of several essential micronutrients [1]. This study assessed the nutritional knowledge, dietary practices, and consumption patterns of fruits and vegetables among in-school adolescents attending LAUTECH International College, Ogbomoso, Oyo State, Nigeria.

**MATERIALS AND METHOD**

A descriptive cross-sectional study design was employed. A total of 216 students from LAUTECH International College, Ogbomoso, were selected using a stratified random sampling technique. Data were collected using a semi-structured questionnaire and analyzed using descriptive and inferential statistics. The chi-square test was used to determine associations between variables at $p < 0.05$. All data were analysed using SPSS version 27.

**RESULTS AND DISCUSSION**

The mean age of the respondents was 13.33 ± 1.69 years. 44.4% of the students demonstrated good nutritional knowledge. Despite this level of knowledge, 58.0% exhibited good dietary practices regarding fruit and vegetable consumption. This result is similar to previous study which showed that 49% of the students demonstrated good nutritional knowledge [2]. Key barriers to fruit and

vegetable consumption included high cost (36.6%), limited availability (29.3%), and poor quality (21.8%). Chi-square analysis revealed no significant association between nutritional knowledge and dietary practices related to fruit and vegetable consumption among the students ($\chi^2 = 0.309$, p = 0.579).

**Table 1: Association between the nutritional knowledge and dietary practice of fruit and vegetable consumption of the respondents**

| Knowledge | Practice F (%) | | | X2 | p-value |
|---|---|---|---|---|---|
| | **Poor** | **Good** | **Total** | | |
| Poor | 52 (57.8) | 68 (54.0) | 120 (55.6) | .309 | .579 |
| Good | 38 (42.2) | 58 (46.0) | 96 (44.4) | | |
| Total | **90 (100.0)** | **126 (100.0)** | **216 (100.0)** | | |

Values of p < .05 indicate statistical significance.

## CONCLUSION AND RECOMMENDATİON:

The findings revealed a gap between nutritional knowledge and actual dietary practices among the students. Although a reasonable proportion demonstrated good dietary practices, fruit and vegetable consumption remained only moderate. The absence of a significant relationship between nutritional knowledge and dietary practices suggests that factors beyond knowledge may influence adolescents' fruit and vegetable consumption behaviours.

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**Theme/Sub-Theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked life stage.

**Topic:** Effect of a Health Belief Model– based Intervention on Diet Quality, Nutrition Knowledge, and Dietary Behaviour Among In-School Adolescents in Ogun, Nigeria.

**Name of author**: Ademiluyi, D. D.[1]*

**Affiliation of authors:** [1]Department of Human Nutrition and Dietetics, Federal University of Medicine and Medical Sciences, Abeokuta, Ogun State, Nigeria.

***Corresponding author:** ademiluyidare@gmail.com, +2347033169105

**Keywords:** Adolescent nutrition; collaborative learning; diet quality; Health Belief Model; school-based intervention

**BACKGROUND**: Adolescence (10–19 years) is a critical window for establishing lifelong dietary behaviours. In Nigeria and Sub-Saharan Africa, poor dietary patterns among adolescents characterised by low fruit and vegetable intake and high consumption of energy-dense foods contribute to the triple burden of malnutrition, including undernutrition, micronutrient deficiencies, and rising rates of overweight and obesity. Conventional didactic school-based nutrition education has largely failed to translate knowledge gains into meaningful behavioural change, underscoring the need for participatory, theory-driven approaches (1).

**OBJECTIVE**: This study evaluated the effectiveness of an eight-week collaborative learning–based nutrition education intervention, guided by the Health Belief Model (HBM), on diet quality, nutrition knowledge, and perceived dietary behaviour among in-school adolescents in Odeda Local Government Area, Ogun State, Nigeria.

**METHODS**: A quasi-experimental, pre-test–post-test control group design was employed. Three hundred adolescents (aged 13–19 years) from two public secondary schools were recruited, with 150 assigned to each group. The intervention group received structured nutrition education using collaborative techniques (buzz groups, reciprocal teaching, problem-based learning, role-playing), while the control group received the same content via conventional didactic instruction. Diet quality was assessed using the Global Diet Quality Questionnaire (DQQ); nutrition knowledge was measured with a validated 20-item tool; and perceived dietary behaviour was evaluated using

an HBM-based 56-item scale. Data were analysed using paired t-tests, independent t-tests, Difference-in-Differences (DiD) analysis, and ANCOVA.

**RESULTS**: The intervention group demonstrated significant improvements in dietary diversity (DDS: +33.74%), NCD-Protect score (+153.22%), and Global Dietary Recommendations score (+39.86%), while the control group showed negligible change (all $p < 0.001$). Nutrition knowledge improved significantly (DiD = 7.94; $p = 0.007$) in the intervention group. All six HBM constructs perceived severity (+18.96%), susceptibility (+20.82%), benefits (+8.51%), barriers (+16.66%), cues to action (+6.59%), and self-efficacy (+13.46%) improved significantly. ANCOVA confirmed the intervention independently predicted improvements in both dietary diversity ($F = 5.08$; $p = 0.026$) and nutrition knowledge ($F = 8.98$; $p = 0.003$) after adjusting for baseline scores and sociodemographic covariates. NCD-Risk scores did not change significantly in either group ($p = 0.967$). The findings underscore the superiority of participatory, theory-driven instruction over conventional didactic approaches (2, 3).

**CONCLUSION**: Collaborative learning–based nutrition education guided by the Health Belief Model is effective in improving diet quality, nutrition knowledge, and health beliefs among in-school adolescents in Nigeria.

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**Sub-theme:** Harnessing the Potential of the Private Sector in Ending Malnutrition in All Its Forms

**Title:** Influence of Food Marketing Strategies and Nutrition Label Awareness on Dietary Choices Among Adult Shoppers in Some Selected Kano Malls

**Authors:** *Kurawa M.S.[1], Dandawaki H.F.[1], Zayyan K.L.[2,] Abba S.J.[1], Lawan Z.[1]

**Affiliations of Authors:** [1]Department of Biochemistry, Nutrition and Dietetics, Bayero University, Kano. [2]Department of Biochemistry, Federal University Dutsinma.
*Corresponding Author: Email: mskurawa.bch@buk.edu.ng Phone No.: 07058351612,
**Keywords:** Food labelling, Marketing Strategy, Nutrition Awareness

**Highlight**

- The findings revealed that food marketing strategies such as advertisements, promotional offers, and attractive packaging influence consumers' purchasing decisions.
- Social media emerged as the most common source of food advertisements among the respondents.
- The study reveals that a large proportion of participants reported that nutrition labels help them make healthier food choices and that it influenced their purchasing decisions.

## Background And Objectives

Food choice is a complex behaviour influenced by multiple factors including cultural beliefs, income, taste preferences, health awareness, and marketing practices. In recent years, the global rise in nutrition-related disorders such as obesity has drawn attention to how individuals make dietary choices. Marketing strategies and nutrition labelling play a significant role in shaping these decisions [1]. In Nigeria, the growing urban population has led to a surge in the consumption of processed and packaged foods [2]. Despite the availability of labels, many consumers do not read the provided information [1]. There is limited empirical data for Northern states such as Kano. This study will therefore try to provide evidence on how Adult Shoppers respond to marketing strategies and interpret nutrition labels and it is awareness in Kano State.

## Material and Method

This study adopted a descriptive cross-sectional research design to examine the relationship between food marketing strategies, nutrition label awareness, and dietary choices among adult consumers in Kano State. The study was conducted in three major supermarkets—Sufi Mart, WellCare, and Barakat Store—and involved 100 adult shoppers (18 years and above) selected through convenience sampling. Data were collected using a structured questionnaire comprising sections on socio-demographic characteristics, food marketing strategies, nutrition label awareness, and dietary choices. The questionnaire underwent face and content validation by experts from the Department of Nutrition and Dietetics, Bayero University, Kano. SPSS version 25 was used for data analysis: descriptive statistics for demographic characteristics and a chi-squared test to examine the relationship between variables in the data.

**Result and Discussion:**

The level of consistent label use remains moderate. While 41% of respondents "usually" check nutrition labels, 43% only do so "sometimes, " and 16% do not check them at all. Despite this, comprehension levels were high; 33% understood labels "Very well" and 34% understood them "Well". Furthermore 85% of respondent says they have changed their decision after reading nutrition label with only 15% saying “No” to the question. This signifies the influence nutrition labelling have on consumers.

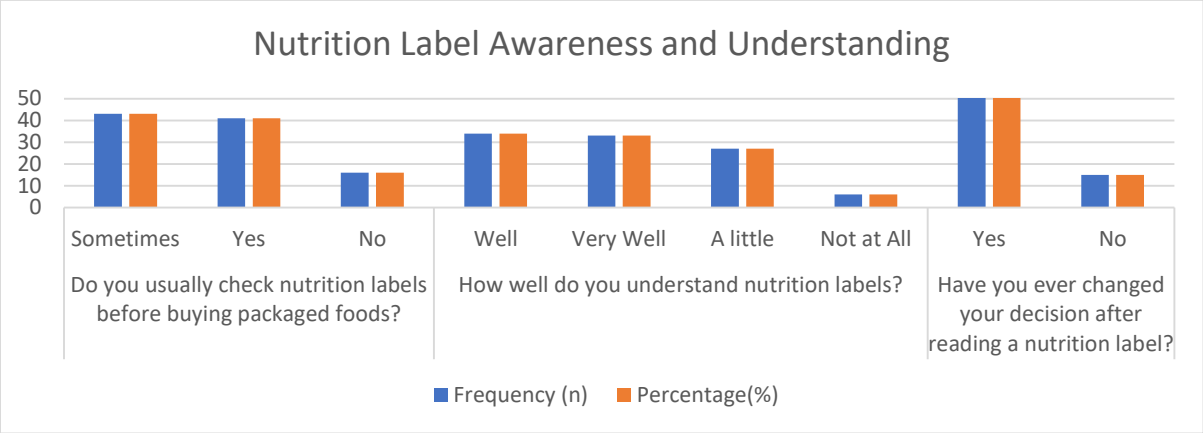



**Figure1:** Nutrition Label Awareness and Understanding

**Discussion**

The findings revealed that many respondents were aware of nutrition labels and had a good understanding of the information provided. This result is consistent with other report that educated consumers in Nigeria are more likely to understand and use nutrition labels when purchasing food products [3]. Despite this awareness, only a moderate proportion of respondents reported consistently checking nutrition labels before buying packaged foods.

**Conclusion and Recommendation**

The findings indicate that most respondents were aware of and understood nutrition labels, with many using the information to make healthier food choices. A substantial proportion also reported changing their purchasing decisions after reading nutrition labels. The Adoption of Simplified Front of Package Labelling is recommended.

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**Theme/Sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

**Title: Prevalence and Risk Factors of Undernutrition Among School-Age Children in Umuahia North Local Government Area, Abia State, Nigeria**

**Authors: *Nwonye, O.[1], Oguizu, A. D.[1], Manawa, O.[2], Makinde J. [2] and Ariyo, O.[2]**

**Affiliation of Authors:** [1]Department of Human Nutrition and Dietetics, Micheal Okpara University of Agriculture, Umudike [2]Department of Human Nutrition and Dietetics, University of Ibadan, Nigeria

*Corresponding author: okemudinwonye0@gmail.com, +2348062549391

**Keywords:** Stunting, Early Adolescents, Determinant, Dietary pattern

**Highlights**

- One in six School age children were stunted and 5.0% were thin by BMI-for-age.
- Maternal occupation and maternal income were significantly associated with stunting.
- Meal skipping was significantly associated with thinness.

**BACKGROUND AND OBJECTIVES:** School-age children are vulnerable to inadequate dietary intake, constrained food access and recurrent infection, and this vulnerability persists into early adolescence, when accelerated growth and pubertal development sharply raise nutrient requirements. Recent review evidence from Nigeria reports adolescent thinness of 3–31% and stunting of up to 41.6%, alongside a rising burden of overweight and obesity [1]. Despite this, school-age children in the transition to adolescence remain under-represented in national nutrition surveillance. Therefore, this study was designed to assess the nutritional status, dietary patterns and risk factors for undernutrition among school-age children in Umuahia North Local Government Area, Abia State.

**METHODS:** A cross-sectional survey was conducted among 260 children aged 6–12 years, selected by multistage sampling from four community primary schools. Data were collected using an interviewer-administered, semi-structured questionnaire including socio-economic characteristics, household water and sanitation, meal frequency and dietary intake. Weight and height were measured in duplicate using standard procedures. Height-for-age and BMI-for-age z-scores were generated using WHO AnthroPlus (2009) and classified against the WHO 2007 growth reference. Data were analysed in IBM SPSS Statistics version 20.0 using descriptive statistics and Chi-square tests of association, with statistical significance set at $p < 0.05$.

**RESULTS AND DISCUSSION:** Respondents comprised 51.5% males and 48.5% females, with the largest single age group being 12 years. Overall, 16.6% were stunted (height-for-age < −2 SD), 6.9% underweight (weight-for-age < −2 SD), and 5.0% were thin (BMI-for-age < −2 SD), while 0.5% were overweight. Dietary patterns were dominated by starchy staples particularly rice (53.8%), garri (53.1%) and yam (40.4%), and prepared with palm oil (70.8%), with tomatoes (41.2%) and pepper (61.5%) consumed daily. Consumption of fruits (Orange 24.2%; Star Apple 19.6%; Mango 16.9%) and legumes (Beans 25.0%; Groundnut 18.1%) was infrequent, and animal-source protein was obtained mainly from dry fish (41.2%) and crayfish (46.2%), indicating limited dietary diversity. Stunting was significantly associated with maternal occupation (p=0.003) and

maternal income (p=0.001). Thinness was significantly associated with meal skipping (p = 0.008) and access to health facilities (p = 0.019). Parental education, paternal occupation, household size, sanitation facilities and drinking water source showed no significant association with either indicator. These findings are consistent with the wider Nigerian literature linking maternal socio-economic position, meal skipping and low dietary diversity to chronic and acute undernutrition in this age group [2]. The predominance of stunting over thinness suggests a cumulative, longstanding deficit rather than recent acute food insecurity.

**Table 1:** Association between Nutritional Status and Risk Factors of Under Nutrition among Respondents

| | Stunted | | BMI for Age | | | |
|---|---|---|---|---|---|---|
| **Variables (n=260)** | **Stunting** | **p-value** | **Thinness (N %)** | **Normal (N %)** | **Overweight (N %)** | **p-value** |
| Mother's Occupation | 39 (18.9) | 0.0034 | 7 (3.4) | 214 (94.2) | 1 (0.5) | 0.000 |
| Mother's Income | 42 (18.8) | 0.001 | 10 (4.5) | 213 (95.2) | 1 (0.4) | 0.017 |
| Good Toilet | 33 (16.6) | 0.168 | 10 (5.0) | 186 (94.4) | 1 (0.5) | 0.254 |
| Drinking Water | 31 (16.1) | 0.560 | 10 (5.2) | 181 (94.5) | 1 (0.5) | 0.455 |
| Good Health Facilities | 20 (13.7) | 0.663 | 12 (8.2) | 133 (91.1) | 1 (0.7) | 0.019 |
| Eating Frequency | 35 (16.1) | 0.415 | 13 (6.0) | 203 (93.5) | 1 (0.5) | 0.529 |
| Family Size | 38 (17.9) | 0.170 | 13 (6.1) | 198 (93.4) | 1 (0.5) | 0.251 |
| Skip Meal | 30 (21.4) | 0.207 | 6 (4.3) | 133 (94.8) | 1 (0.7) | 0.008 |

***Note: All risk factors variables were measured as Yes/No responses. Only the "Yes" responses are presented in this table. Associations were tested using the Chi-square test, with p < 0.05 considered statistically significant.***

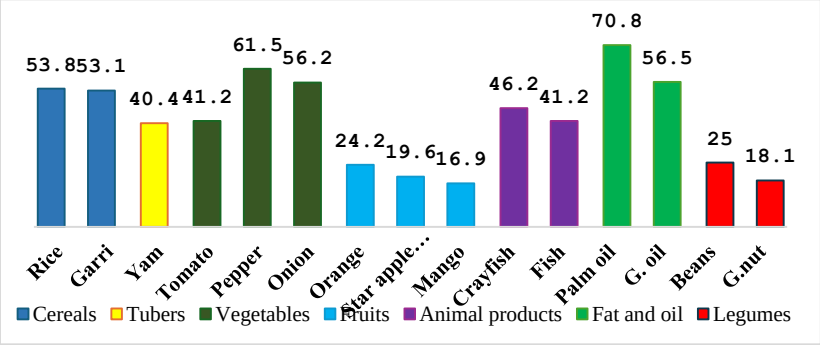



**Figure: Daily Consumption of Food Groups among Respondents (n=260)**

**CONCLUSION AND RECOMMENDATION(S):** Maternal socio-economic position and household meal practices are key determinants of undernutrition among school-age children in Umuahia North. The observed reliance on starchy staples with limited fruit, legume and animal-source food intake points to a dietary quality deficit rather than quantity alone. Interventions should combine maternal economic empowerment with school-based nutrition education promoting regular meal patterns and dietary diversification. Extending routine nutrition surveillance to cover the 6–12 year age band would strengthen the evidence base for programming at this neglected life stage.

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**SUB-THEME**

Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**TITLE:** Knowledge, Attitude and Consumption Practices of Fruits and Vegetables among Male Adolescents in Selected Secondary Schools in Ibadan, Oyo State, Nigeria

**AUTHORS:** Balogun, O. O.[1], Olaniran, O.P[1*], Ado O.E[1]

**AFFILIATIONS:** [1]Department of Human Nutrition and Dietetics, Lead City University, Ibadan, Nigeria

*Corresponding Author: olaniran765@gmail.com; +2348105051939*

**KEYWORDS:** Adolescents; Fruits and vegetables; Knowledge; Consumption practices

**HIGHLIGHTS**

- 58.3% of respondents had good knowledge of fruits and vegetables
- 61.2% demonstrated good fruits and vegetable consumption practices
- Knowledge and attitude significantly influenced consumption practices

**BACKGROUND AND OBJECTIVES**

Fruits and vegetables are important sources of essential nutrients and play a critical role in promoting growth and preventing non-communicable diseases [1]. Despite their benefits, consumption among adolescents remains inadequate in many developing countries, including Nigeria [2]. Poor dietary habits established during adolescence often persist into adulthood, increasing the risk of adverse health outcomes [3]. This study assessed the knowledge, attitude, and consumption practices of fruits and vegetables among male adolescents in selected secondary schools in Ibadan, Oyo State, Nigeria, and examined the relationship between knowledge, attitude, and consumption practices.

**MATERIALS AND METHODS**

A descriptive cross-sectional study was conducted among 348 male adolescents selected from secondary schools in Ibadan, Oyo State. Data were collected using a structured, pre-tested questionnaire assessing socio-demographic characteristics, knowledge, attitude, and consumption practices regarding fruits and vegetables. Data were analysed using SPSS version 25. Descriptive statistics were summarized using frequencies and percentages, while Chi-square test was used to determine relationships between variables at $p < 0.05$.

## RESULTS AND DISCUSSION

Most respondents attended public schools (98.0%), lived with parents or guardians (96.3%), and had parents as providers of daily meals (89.9%). Good knowledge of fruits and vegetable consumption was observed among 58.3% of respondents, while 28.4% had moderate knowledge. Positive attitudes were reported by 39.1%, whereas 59.5% demonstrated neutral attitudes. Furthermore, 61.2% exhibited good consumption practices, while 24.4% and 14.4% had moderate and poor practices, respectively. Knowledge and attitude were significantly associated with consumption practices ($p < 0.001$).

**Table 1: Knowledge, Attitude and Practice Levels of Respondents (N = 348)**

| Variables | Frequency | Percentage (%) |
|---|---|---|
| **Knowledge Level** | | |
| Poor | 46 | 13.2 |
| Moderate | 99 | 28.4 |
| Good | 203 | 58.3 |
| **Attitude Level** | | |
| Negative | 5 | 1.4 |
| Neutral | 207 | 59.5 |
| Positive | 136 | 39.1 |
| **Practice Level** | | |
| Poor | 50 | 14.4 |
| Moderate | 85 | 24.4 |
| Good | 213 | 61.2 |

**Table 2: Relationship between Knowledge, Attitude and Consumption Practices**

| Variables | Level of Practice | | | $\chi^2$ | df | p-value |
|---|---|---|---|---|---|---|
| | Poor n (%) | Moderate n (%) | Good n (%) | | | |
| **Knowledge Level** | | | | 284.065 | 4 | 0.000** |
| Poor Knowledge | 44 (95.7) | 0 (0.0) | 2 (4.3) | | | |
| Moderate Knowledge | 3 (3.0) | 28 (28.3) | 69 (68.7) | | | |
| Good Knowledge | 3 (1.5) | 57 (28.2) | 142 (70.3) | | | |
| **Attitude Level** | | | | 105.391 | 4 | 0.000** |
| Negative Attitude | 3 (60.0) | 1 (20.0) | 1 (20.0) | | | |
| Neutral Attitude | 2 (1.0) | 51 (24.6) | 154 (74.4) | | | |
| Positive Attitude | 0 (0.0) | 33 (24.3) | 103 (75.7) | | | |

These findings support previous studies indicating that nutrition knowledge and positive dietary attitudes are important determinants of healthy eating behaviours among adolescents [4].

## CONCLUSION AND RECOMMENDATIONS

The study revealed that although most respondents possessed good knowledge of fruits and vegetable consumption, a substantial proportion still exhibited neutral attitudes and suboptimal consumption practices. Knowledge and attitude were significantly associated with fruit and vegetable consumption practices. There is a need to strengthen adolescent nutrition programmes through school-based nutrition education, behavioural change communication, and increased access to affordable fruits and vegetables. Nutrition promotion initiatives targeting adolescents should also emphasize practical strategies for translating nutrition knowledge into healthy dietary behaviours.

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**Theme/Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Design and Evaluation of a School-Based Intervention on Cooking Literacy, Nutrition Knowledge, and Ultra-Processed Food (UPF) Consumption among In-School Adolescents in Ibadan

**Name of Author(s):** *Raphael, V.A.[1], Arulogun T.G[1], and Samuel, F.O.[1]

**Affiliation of Author(s):** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria

* Corresponding author, e-mail: victoriaderaphael@gmail.com, +2347063583467

**Keywords:** UPF; NOVA-classification; Cooking literacy; School-based intervention

**Highlights**

- Cooking literacy improved significantly after the intervention ($p<0.001$)
- UPF knowledge increased significantly following the intervention ($p<0.001$)
- UPF consumption frequency showed no significant post-intervention change ($p=0.471$)

**BACKGROUND AND OBJECTIVES:**

Adolescence is a critical developmental stage for establishing lifelong dietary habits, yet the rising consumption of ultra-processed foods (UPFs) among adolescents in low- and middle-income countries, including Nigeria, is a growing public health concern. The ongoing nutrition transition, poor nutrition knowledge, and low cooking literacy limit adolescents' ability to make healthier food choices, and Nigeria's school curriculum lacks structured cooking or nutrition education, with little localized evidence evaluating school-based interventions to address this gap. This study aimed to evaluate the effectiveness of a school-based intervention on cooking literacy, nutrition knowledge, and UPF consumption among in-school adolescents in Ibadan, Oyo State, Nigeria.

**MATERIALS AND METHODS:**

A one-group pre-test–post-test quasi-experimental design was employed among 120 in-school adolescents aged 10–19 years, selected using multi-stage sampling from three secondary schools in Ibadan North Local Government Area. A validated, pre-tested questionnaire assessed cooking literacy, nutrition knowledge, UPF knowledge, and NOVA-based UPF consumption frequency. The questionnaire and nutrition education tools used for the intervention were validated by nutrition experts and lecturers in UI, and consisted of six weekly sessions delivered within two months, comprising interactive nutrition education modules, hands-on cooking demonstrations, and group-based activities designed to enhance cooking literacy and reduce UPF consumption. Post-intervention evaluation was carried out one week after the intervention. Data were analysed using IBM SPSS Statistics version 27, using paired and independent t-tests, with statistical significance set at $p<0.05$. Ethical approval was obtained from the University of Ibadan/University College Hospital Research Ethics Committee, and written informed consent and assent were obtained from schools and participants, respectively.

**RESULTS AND DISCUSSION:**

Cooking literacy improved significantly ($90.37\pm12.92$ to $101.87\pm11.36$; $p<0.001$, $d=0.65$), indicating that the school-based sessions were effective, consistent with evidence that cooking programmes reliably improve food-related self-efficacy [1]. Nutrition knowledge showed no change ($p=1.000$); category-level analysis showed 69.2% of participants already had high nutrition

knowledge at baseline, indicating a ceiling effect that limited measurable gains [2]. UPF knowledge rose significantly (3.25±1.99 to 5.33±1.10; $p<0.001$, $d=0.89$), showing that participants could better understand, identify, and differentiate UPFs, supporting the role of NOVA-based food-literacy education in shaping healthier dietary decisions [3]. However, UPF consumption frequency increased slightly, which was not statistically significant (22.54±8.65 to 23.33±9.37; $p=0.471$), suggesting that improved awareness alone did not translate into immediate behavioural change; this is consistent with evidence that low cooking self-efficacy, not knowledge, sustains UPF reliance among adolescents [4], and highlights the need for longer exposure to change consumption patterns [5] and environmental reinforcement (see Figure 1).

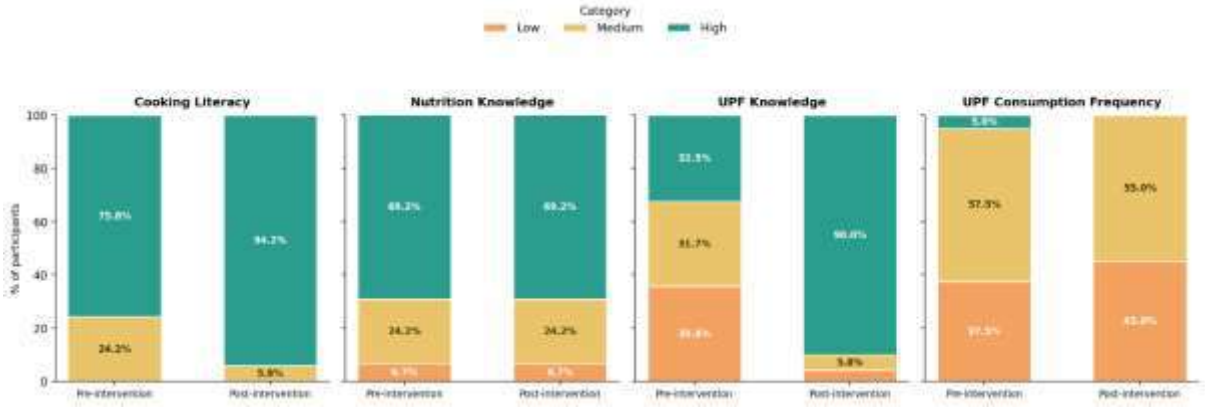



**Figure 1: Distribution of Participants by Category (Low/Medium/High), Pre- and Post-Intervention (N=120)**

## CONCLUSION AND RECOMMENDATION(S):

Experiential, skill-based learning significantly improved adolescents' cooking literacy and UPF knowledge both in identifying and classifying, but not nutrition knowledge or UPF consumption frequency within the short intervention period, supporting previous evidence that knowledge gains do not automatically translate into behavioural change. Cooking literacy and nutrition education, including UPF identification, should be integrated into the Nigerian secondary school curriculum, and future interventions sustained over a longer duration supported by parental and school food-environment involvement to reinforce lasting dietary behavioural change.

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**Sub-theme:** Adolescent Nutrition and health: Characteristics, risk factors and opportunities of an overlooked life stage

**Title:** Cost and Affordability of Healthy Diets among Undergraduate Students in a private University, Ogun State

**Name of author:***Akinsanya, O.B[1]., Ayano, O.B.[1], Adewale I.O., Olaosun A.R[1]., Oyelayo E.O[1]., Lawani O.F[1]., Adebayo Y.O.

[1]Department of Food Science and Technology, College of Food, Agricultural Science and Technology, Bells University of Technology, Ota, Ogun State, Nigeria.
Corresponding author: bunmifavourite@gmail.com, +2348032366698

**Keywords:** Food affordability, healthy diet, student income, FAO CoAHD model

**Highlights**

- Students would need 106% of their monthly income to afford a healthy diet
- Monthly Cost of Healthy Diet (₦100,380) exceeded mean student income (₦94,712)

## BACKGROUND AND OBJECTIVES

Food affordability is a critical determinant of nutritional status and academic achievement among undergraduates who are majorly adolescents, particularly in developing economies experiencing persistent food inflation (1). The Food and Agriculture Organization (FAO) Cost and Affordability of a Healthy Diet (CoAHD) model provides a standardized framework for comparing the cost of nutritionally adequate diets against population income levels, using a threshold of 52% of income to determine affordability (2). In Nigeria, food inflation reached 32.4% in September 2024 (3), yet limited empirical evidence exists on whether students' incomes sufficient to afford healthy diets according to FAO/WHO dietary standards. This study therefore was aimed to compare the cost of a healthy diet with the average monthly income of undergraduate students at Bells University of Technology, Ota.

## MATERIALS AND METHOD

A descriptive cross-sectional design was used. Respondents were drawn from all six colleges of Bells University of Technology through stratified random sampling. Sample size was calculated using Fisher's formula based on a 31.9% global prevalence of unaffordable healthy diets (1), and a total of 333 students were recruited by using multistage sampling techniques. Data were collected using structured questionnaires capturing monthly income/allowance and campus food prices. The

Cost of a Healthy Diet (CoHD) was estimated using FAO's least-cost methodology identifying the lowest-cost combination of foods that could meet a nutritionally adequate meal pattern across three meals (breakfast, lunch, dinner). Monthly CoHD was calculated as daily CoHD × 30 days and compared to reported student income. Affordability was assessed using the FAO threshold of ≤52% of income, with higher percentages indicating unaffordability (4). Composite Affordability Scores (CAS) were computed from 10-item Likert scales measuring perceived affordability. Data were analysed in SPSS version 28.0.

**RESULTS AND DISCUSSION**

The estimated daily Cost of a Healthy Diet at Bells University was ₦3,346, translating to a monthly CoHD of ₦100,380 (Table 1). The mean monthly student income was ₦94,712, yielding a CoHD-to-income ratio of 106.0%, more than double the FAO affordability threshold of 52% of income. This indicates that students would need to spend more than their entire monthly income to afford a healthy diet according to FAO/WHO dietary standards. Income distribution showed considerable heterogeneity: 39.3% (n = 157) reported incomes of ₦120,000 or more, while 4.5% (n = 18) survived on less than ₦20,000 monthly. Even at ₦120,000/month, the CoHD represented 77.2% of income still well above the 52% threshold. The Composite Affordability Score was 2.81 ± 0.45, with 25.3% of students falling into the low affordability category. The prevalence of unaffordability recorded in this study (106% CoHD-to-income ratio) is markedly higher than the global average of 42% for low-income populations (1), reflecting the combined effects of high campus food prices and limited student income sources. These findings suggest that improving the affordability of healthy diets among students plays a significant role in enhancing access to nutritious diets and promoting students' health, wellbeing, and food security.

**Table 1: Cost of a Healthy Diet (CoHD) versus Undergraduate Student Income in a private Universitiy**

| Parameter | Value |
|---|---|
| Daily CoHD (FAO Least-Cost Approach) | ₦3,346 |
| Monthly CoHD (× 30 days) | ₦100,380 |
| Mean Monthly Student Income | ₦94,712 |
| **CoHD-to-Income Ratio** | **106.0%** |
| FAO Affordability Threshold | ≤ 52% of income |
| **Affordability Verdict** | **UNAFFORDABLE** |

## CONCLUSION AND RECOMMENDATION

This study revealed a significant affordability gap among Bells undergraduate students, with the Cost of a Healthy Diet exceeding the average monthly income by 6%, and the CoHD-to-income ratio (106%) far exceeding the FAO affordability threshold of 52%. The affordability crisis is pervasive across all income strata, suggesting structural rather than individual financial factors. Periodic monitoring is recommended to track whether affordability levels shift as food prices and student allowances change.

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**Subtheme:** Adolescent nutrition and health: characteristics, risk factors, and opportunities of an overlooked life stage

**Title:** Effect of enhanced cooking method of pigeon pea on iron status of adolescent girls in Nsukka, Enugu State

**Name of Authors:** [1]Ikekwem, K. R., [2]Ayogu, R. N. B., *[1]Okafor, I. G.

**Affiliation of Authors:** [1]Department of Human Nutrition and Dietetics, Nnamdi Azikiwe University, Nnewi Campus

[2] Department of Nutrition and Dietetics, University of Nigeria Nsukka

*Corresponding author email: ifg.okafor@unizik.edu.ng

+2348104437785

**Keywords:** Adolescents, haemglobin, Nsukka, Pigeon pea, Serum ferritin, Serum iron

**Highlights:**

- There was an increase in haemoglobin and ferritin after the experiment.
- The increase in haemoglobiin levels was significantly higher after the experiment

**BACKGROUND AND OBJECTIVES:** Adolescence (10–19 years) is a critical period of rapid growth associated with increased iron requirements, making adolescent girls particularly vulnerable to iron deficiency anaemia. Pigeon pea, a commonly consumed legume in Nsukka, Enugu State, is an affordable source of dietary iron and other essential nutrients. This study assessed the effect of an enhanced cooking method of pigeon pea on the iron status of adolescent girls in Nsukka, Enugu State.

**MATERIALS AND METHODS:** A randomized, controlled, single-blind experimental design was adopted. Twenty-six adolescent girls from two purposively selected secondary schools in Nsukka, Enugu State, were randomly assigned to intervention (Group A) and control (Group B) groups after obtaining informed consent and parental consent. All participants received a single 400 mg dose of albendazole before the intervention. Over four weeks, Group A consumed pigeon pea-based dishes prepared with the cooking water totally absorbed, while Group B received dishes prepared with the cooking water discarded. Individual portions were calculated to provide one-third of the recommended daily iron requirement based on age using the average of iron content of both pigeon pea samples. Venous blood samples collected before and after the intervention were analysed for haemoglobin, serum iron and serum ferritin using standard methods. Data were analysed using SPSS version 25, and paired-samples t-test was used to compare baseline and post-intervention values.

**Calculation of portion size per day**

Iron content of sample A = 2.43 g/100g
Iron content of sample B = 1.14 g/100g
Average = $\frac{2.43+1.14}{2}$ = 1.79 ≈ 2.0 mg/100g
For 10-13 years: $\frac{100\ x\ 2.7}{2.0}$ = 135 g/day
For 14-18 years: $\frac{100\ x\ 5}{2.0}$ = 250 g/day
For 19 years: $\frac{100\ x\ 6}{2.0}$ = 300 g/day

## RESULTS AND DISCUSSION

The intervention resulted in improved haemoglobin concentrations among the adolescent girls, with a statistically significant increase observed in Group A but not in Group B. The higher haemoglobin response in Group A may be attributed to the consumption of pigeon pea-based dishes prepared with undecanted pigeon peas, which contained higher iron levels. This finding contrasts with Yunus[1] and Finkelstein et al.[2], who reported no significant improvement in haemoglobin following iron-fortified lentil and biofortified bean interventions, respectively. However, it is consistent with the findings of Haas et al.[3], who observed improved haemoglobin levels following the consumption of iron-biofortified beans.

Serum iron concentrations declined in both groups, although the reduction was significant only in Group B. This finding may reflect the limited reliability of serum iron as an indicator of body iron stores because it is influenced by recent dietary intake and physiological factors such as infection. Serum ferritin increased slightly in Group A and decreased in Group B, with neither change reaching statistical significance. Similar insignificant changes in serum ferritin have been reported by Finkelstein et al.[2] and Haas et al.[3], whereas Yunus[1] observed a reduction in serum ferritin following iron-fortified lentil consumption.

**Table 1: Effect of the pigeon pea-based dishes on the iron status of the adolescent girls**

| Variables | Group | Baseline mean ± SD | Endline mean ± SD | Mean difference ± SD | Percentage change (%) | P-value |
|---|---|---|---|---|---|---|
| Haemoglobin (g/dL) | Group A | 15.08 ± 2.70 | 17.53 ± 3.32 ↑ | -2.27 ± 2.85 | 14.87 | 0.01* |
| | Group B | 16.18 ± 2.44 | 17.85 ± 2.36 ↑ | -1.67 ± 2.82 | 10.32 | 0.05 |
| Serum iron (µg/dL) | Group A | 133.85 ± 32.54 | 133.38 ± 32.31 ↓ | 0.46 ± 36.48 | 0.34 | 0.96 |
| | Group B | 160.77 ± 34.27 | 133.08 ± 26.94 ↓ | 27.67 ±42.56 | 17.21 | 0.03* |
| Serum ferritin (µg/L) | Group A | 121.54 ± 56.60 | 132.48 ± 36.08 ↑ | -10.94 ± 69.80 | 9.00 | 0.63 |
| | Group B | 148.10 ± 77.92 | 127.62 ± 39.71 ↓ | 20.48 ± 63.05 | 13.82 | 0.33 |

Group A = adolescent girls who consumed pigeon pea-based dishes cooked with the pigeon pea cook water completely absorbed
Group B = adolescent girls who consumed pigeon pe- based dishes cooked with the pigeon pea cook water discarded
*=P<0.05 SD = Standard Deviation

## CONCLUSION AND RECOMMENDATIONS:

The present study shows that consumption of undecanted pigeon pea had a positive effect of the haemoglobin and serum ferritin levels of the respondents. Cooking pigeon peas to ensure no water is left to discard should be adopted while preparing the pigeon-pea based dishes to maximize the iron content of the legume.

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**Theme/Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title: Consumption Patterns and Nutritional Status of Undergraduate Students in Abeokuta, Ogun State, Nigeria**

*Lam, F.J.[1], Ilori, O.A.[1], , Onaolapo, T.T.[1], Akinmoladun O.[2], Olatunji, O.J.[1] and Oose, O.I.[3]

[1]*Department of Nutrition and Dietetics, Moshood Abiola Polytechnic Abeokuta, Ogun State.*

[2]*Department of Nutrition and Dietetics, University of Medical Sciences, Ondo.*

[3]*Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta.*

Corresponding author, e-mail: lamjoy0815@gmail.com

**Keywords:** Consumption patterns, Stress, Nutritional status, Undergraduate students

**Background And Objectives**: Students, consumption patterns can be shaped by factors such as academic pressures, social dynamics (adjustment), and limited access to affordable nutritious food (homemade and fast foods) has been linked to overweight and underweight [1]. This study assessed students' socio-demographic, anthropometric and dietary characteristics, examined the prevalence of stress and its influence on eating behavior and determined the correlation between dietary intake and nutritional status.

**METHOD**

A descriptive cross-sectional study was conducted among 750 undergraduate students of the Federal University of Agriculture Abeokuta, Moshood Abiola Polytechnic Abeokuta and Federal Polytechnic Ilaro, Ogun State. Using Cochran's formula with a design effect of 1.95 for multistage sampling. A validated structured self-administered questionnaire capturing socio-demographic/economic status, anthropometry, dietary habits and stress related data were analyzed using SPSS with descriptive statistics and correlation analysis.

## RESULTS AND DISCUSSION

Most respondents (75.3%) were aged 18-22 years and 60.5% were female. Meal patterns were irregular: 66.7% skipped breakfast regularly, 63.2% did not eat at fixed times, and 57.5% ate late at night. Table 1 shows 57.9% of respondents had normal BMI, 25.9% were underweight and 12.9% overweight, this differs notably from Tinu's finding 2020 who reported lower underweight but higher rate of normal, overweight and obesity [2].

| BMI Category | Frequency | Percentage (%) |
|---|---|---|
| Underweight | 194 | 25.9 |
| Normal weight | 434 | 57.9 |
| Overweight | 97 | 12.9 |
| Obese | 17 | 2.3 |
| **Total** | **750** | **100.0** |

Table 2 shows high stress related eating disruption, including meal skipping (74.7%) and increased food intake (41.5%), notably higher than rates reported by Ruchika [3] (26% and 13.4% respectively). These disparities may reflect difference in study populations and measurement approaches, underscoring for targeted stress management and dietary counseling intervention among undergraduates**.** Feeling overwhelmed, frequent headaches and anxiety about the future correlated significantly with physical activity ($p<0.05$), and irritability was significantly associated with BMI ($p=0.001$).

| Eating Behavior under Stress | Frequency | Percentage (%) |
|---|---|---|
| Ate more when stressed | 311 | 41.5 |
| Ate less when stressed | 380 | 50.7 |
| Skipped meals due to stress | 560 | 74.7 |
| Reported irregular eating patterns | 563 | 75.1 |

## CONCLUSION AND RECOMMENDATION(S)

Consumption patterns among the students were largely irregular and shaped by academic and financial stress, with most maintaining normal BMI but a notable underweight minority. Tertiary institutions should strengthen nutrition education, counselling and stress-management services, and promote regular meals and physical activity.

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**Sub-Theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Body Image Perception and Dietary Pattern of Secondary School Students in Ikorodu, Lagos State

**Name of Authors:** Akinsola, F. F.[1], *Olutunde, B. A.[2] and Isiakpona, O. O.[1]

**Affiliation of Authors:**

[1]Nutrition and Dietetics Department, Bowen University, Iwo.

[2]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan.

***Corresponding Author**, email: fayofunmiolutunde@gmail.com +2348159990803

**Keywords:** Body Image, Dietary pattern, Adolescents, Students

**Highlights:**

- Perceived body image of the adolescents is positive
- Most adolescents perceived themselves to be of normal weight; however, less than half are of normal body weight
- Overall Appearance Evaluation was associated with the consumption pattern of fruits, cereals and grains, and dairy

**Background and Objective:** Body image perception involves the assessment and estimation of the size, shape and attractiveness of one's own body [1]. Perceived body image is a psychological, subjective concept that significantly shapes adolescents' behaviours [2]. Distorted body image perception appears to be a key factor influencing harmful dietary patterns and practices such as meal skipping, excessive snacking, and unhealthy food choices, warranting focused investigation and intervention [3]. This study assessed the relationship between body image perception and dietary patterns of secondary school students in Ikorodu, Lagos State, Nigeria.

**Materials and Method:** A descriptive cross-sectional study was conducted among 412 students across junior and senior secondary classes aged 12-19 years, selected from eight government-approved secondary schools in Ikorodu, Lagos State, using a multistage sampling technique. Data were obtained using a structured questionnaire with sections including socio-demographic characteristics, anthropometric data, food frequency questionnaire and the Body Self-Image Questionnaire – Short Form (BSIQ-SF). BSIQ-SF contains 9 subscales with 3 items in each subscale, which are scored between 3 and 15 points per subscale. Three out of nine subscales: Overall appearance evaluation (OAE), Height dissatisfaction (HD) and Fatness evaluation (FE),

which are relevant to nutrition, were especially noted in the study. Data were analyzed using SPSS version 27.0. Descriptive statistics such as frequencies, percentages, and mean ± SD were used for demographic and anthropometric variables, while the chi-square test examined associations between variables, with $p<0.05$ considered significant.

**Results:** More than half (56.8%) of the respondents were females and mostly Yorubas (72.8%) with a mean age of 14.42±1.49 years. The mean BMI of the respondents was 19.57±3.38 kg/m$^2$ and less than half (47.6%) were of normal BMI; although the majority (83.7%) perceived themselves to be of normal weight, while only 31.8% were content with their body image. The mean BSIQ-SF subscale scores were good: OAE 13.02±2.29; HD 8.08±3.73 and FE 4.92±2.59, showing that the respondents had good Perceived Body Image. The Chi-square test revealed a statistically significant association between Overall Appearance Evaluation and consumption pattern of fruits ($p$ = 0.018), cereals and grains ($p$ = 0.016), and dairy ($p$ = 0.011), revealing that respondents with good OAE scores consumed food items from these food groups more frequently. This result aligns with [4], who found that adolescents with high appearance scores related to body image perception tend to make healthier food choices.

**Conclusion and recommendation**: The perceived body image of secondary school students in Ikorodu is positive, and most adolescents have a healthy dietary pattern; however, less than half of the adolescents were of normal body weight. This highlights the need for integrated nutrition education and body-positive interventions to control dietary choices and other factors which can compromise the nutritional status of adolescents.

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**THEME/SUB-THEME: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

**TITLE: Fruit and Vegetable Consumption and Associated Factors among In-School Adolescents in Ibadan, Nigeria: Implications for Promoting Adolescent Nutrition**

**Name of Author(s): Jesuyemi, G.P.[1], and Adepoju, O. T.[1]**

**Affiliation of Author(s):** [1] Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Nigeria

Correspondence: phebeannajesuyemi@gmail.com, +2349032442559

**Keywords: Adolescent nutrition, Fruit consumption, Vegetable consumption, and Dietary behaviour**

**Highlights**

1. Daily fruit and vegetable intake was low among most adolescents.
2. Over half of the adolescents were unaware of the WHO-recommended daily fruit and vegetable intake
3. Consumer preference and sensory characteristics were key reported influences on fruit and vegetable consumption

**Background and Objectives:**

Adolescence is a critical stage of life course characterised by rapid growth, increased nutritional requirements, and establishment of lifelong dietary behaviours [1, 2]. Despite its importance, adolescent nutrition remains relatively underrepresented in nutrition research and programming compared with women of reproductive age and young children [1, 3]. Adequate fruit and vegetable consumption is an essential component of healthy diets, contributing to micronutrient adequacy and reducing the risk of diet-related diseases [4]. However, fruit and vegetable consumption remains below recommended levels in Nigeria, and evidence on consumption and associated factors among adolescents remains limited [1, 5]. Understanding factors associated with fruit and vegetable consumption is essential for designing effective nutrition interventions [5]. Therefore, this study assessed fruit and vegetable consumption, awareness of the WHO-recommended daily intake, and associated factors among in-school adolescents in Ibadan, Nigeria.

**Materials And Methods**

A descriptive cross-sectional study was conducted among 292 in-school adolescents aged 10–19 years selected from four secondary schools in Ibadan North Local Government Area, Oyo State, Nigeria, using a multistage sampling technique. A structured questionnaire was used to obtain information on sociodemographic characteristics, fruit and vegetable consumption, awareness of the WHO-recommended daily intake, knowledge of the health and nutritional benefits of fruits and vegetables, and perceived factors influencing consumption. Knowledge scores were categorised as poor (0–3), fair (4–6), or good (7–8). Data was analysed using descriptive statistics to summarise study variables, while Chi-square test was used to assess associations between sociodemographic characteristics and fruit and vegetable consumption at $p < 0.05$.

**Results and Discussion**

Daily fruit and vegetable intake was generally low, with most participants reporting fewer than 2 servings or none at all (Table 1). Approximately 54% of participants were unaware of the WHO-recommended daily intake of fruits and vegetables. Although most participants demonstrated fair knowledge of the health and nutritional benefits of fruits and vegetables (56.2%), only 32.4% had good knowledge. Consumer preference (57.9%), sensory characteristics (57.2%), and awareness of nutritional benefits (42.6%) were the most frequently reported influences on consumption. Significant associations were observed between fruit consumption and sex ($p = 0.015$), vegetable

consumption and educational level ($p = 0.001$), while awareness of the recommended intake was associated with maternal occupation ($p < 0.001$), maternal education ($p = 0.009$), paternal occupation ($p = 0.021$), religion ($p = 0.024$), and educational level ($p < 0.001$). The findings highlight inadequacies in fruit and vegetable consumption and limited awareness of the WHO-recommended daily fruit and vegetable intake among adolescents, reinforcing concerns about suboptimal dietary behaviours during this critical stage of growth and development. The prominence of consumer preference and sensory characteristics indicates that behavioural and environmental factors may play an important role in shaping fruit and vegetable intake among adolescents.

**Table 1. Daily fruit and vegetable consumption among in-school adolescents (n= 292)**

| Indicator | Not consumed n (%) | <2 servings n (%) | 2–4 servings n (%) | ≥5 servings n (%) |
|---|---|---|---|---|
| **Fruit/day** | 43 (14.7) | 114 (39.0) | 98 (33.6) | 37 (12.7) |
| **Vegetables/day** | 42 (14.4) | 130 (44.5) | 75 (25.7) | 45 (15.4) |

## Conclusion and Recommendation

Fruit and vegetable consumption among in-school adolescents was suboptimal, with substantial gaps in awareness of the recommended daily intake. Consumer preference and sensory characteristics were the most commonly reported influences on fruit and vegetable consumption, while selected sociodemographic factors showed significant associations with consumption and awareness. These findings underscore the need for school-based, context-specific nutrition interventions that improve nutrition knowledge and create supportive environments for healthy dietary choices during adolescence.

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**Theme/sub-theme:** Delivering Better Nutrition for All: Connecting the Dots across Life Cycle, Systems and Sectors"/ Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Dietary Pattern and Nutritional Status of Secondary School Students in Ogbomoso North, Oyo State.

**Name of Author (s): ***Adeyemo, G.A.[1], Alabi, O.D.[1], Kareem, B.R.[1], Olatoyinbo, K.M.[1], Yusuf, A.O.[1], Ayeni, B.P.[1], and Olokede, O.E[1]

**Affiliation of Author (s):** [1] Department of Nutrition and Dietetics, Ladoke Akintola University of Technology. Ogbomoso, Oyo State.

*adeyemoadebola04@gmail.com, +2348060373131

**Keywords:** Adolescents, Nutritional Status, Body Mass Index, Adequacy

**Highlights:**

- More than 60% of the adolescent students did not meet the recommended intake for protein, acceptable macronutrient distribution range for fat and energy intake
- There was double burden of malnutrition among the adolescents
- Age group and parents' education had significant effects on nutritional status

**BACKGROUND AND OBJECTIVES:**

Adolescents described by (1) as people in the age range 10 – 19 years; need adequate nutrition for both their current and future health outcomes, including those of future generations.

Despite available studies, much of the existing literature emphasizes urban populations in Southern Nigeria, leaving semi-urban areas such as Ogbomoso North underrepresented despite the locality presenting unique socio-cultural and economic influences where traditional diets intersect with increasing exposure to processed and Westernized foods. This study thus aimed to assess the dietary pattern and nutritional status of secondary school students in Ogbomoso North, Oyo State.

**MATERIALS AND METHOD:**

A descriptive cross-sectional design was employed for the study. Simple random sampling (balloting) was used to select four secondary schools (two public and two private) from 20 listed schools while systematic random sampling was used to pick equal number of participants from Junior to Senior classes from each school to get a total of 250 respondents. A semi-structured questionnaire was used to obtain information on socio-demographic characteristics, eating habits, food consumption frequency, anthropometric status, and 24-hour dietary recall of the adolescent students. Food Frequency Questionnaire was adapted from [2]. Macro nutrients and caloric adequacy were determined using reference intakes specified by [3]. Data were analysed using SPSS version 22, Food Processor and WHO AnthroPlus. Ethical approval and oral informed consent were obtained from the appropriate authorities and students.

## RESULTS AND DISCUSSION:

Age group of the students was 11 to 18 years, and the majority (36.8%) had a monthly stipend of ₦ 10,000 to ₦ 15,000. Carbohydrate, protein, fat, and calorie adequacy were met by 100%, 30.0%, 39.2% and 35.2%, respectively. Underweight prevalence was 11.2%, while 14.88% were overweight/obese among the adolescents, which is an indication of the double burden of malnutrition has also been reported by (4). Overweight/ Obesity rise among older children in Nigeria may be due to nutrition transition which has led to high consumption of westernised diets (4). Dietary pattern results showed that 30% of the adolescents skipped breakfast regularly and another 30% skipped it sometimes, a dietary pattern that has been associated with increased body mass index (5). This could also be a contributing factor to the high prevalence of overweight/obese reported in this study. However, there was no significant difference between carbohydrate, protein, fat and calorie adequacy, and nutritional status among the adolescents ($p = 0.998$, 0.998, 0.916 and 0.998 respectively) suggesting that BMI outcomes among the respondents may not be solely determined by dietary intake. Age group had a significant effect on nutritional status ($p = 0.044$) with 15 to 18 years showing a gradual increase in underweight (24%) and overweight prevalence (24%). Also, parents' education; father ($p = 0.017$), mother ($p = 0.023$) was significantly associated with nutritional status. This study revealed that the food consumption frequency of secondary school students in Ogbomoso are dominated by cereals and starchy staples such as rice, bread, noodles, and yam, while the intake of fruits, dairy products, and leafy vegetables remain low. Protein sources like cow meat, chicken, and fish were moderately consumed.

## CONCLUSION AND RECOMMENDATION:

In conclusion, this study revealed the existence of double burden of malnutrition reflecting the nutrition transition ongoing in Nigeria with reliance on processed and energy-dense foods.

It is recommended that nutrition education should be integrated into schools curricula and extracurricular activities, and school feeding programmes should be promoted

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**SUB THEME 4: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

**Title**: Assessment of Food Purchasing Patterns and Nutritional Status among Adolescents in Federal Polytechnic Ilaro, Ogun State, Nigeria

Adewunmi, H.O., Falana S. O., Gabriel, E., Adetula, O.A., and Akinde, K.M.

Corresponding email: hameedat.adewunmi@federalpolyilaro.edu.ng

Department of Nutrition and Dietetics, The Federal Polytechnic, Ilaro, Ogun State, Nigeria.

**Keywords**: Adolescents, food purchasing pattern, nutritional status, BMI-for-age, height-for-age

**HIGHLIGHTS**

- Most adolescents had normal BMI-for-age (61.3%) and height-for-age (72.5%).
- Local markets and supermarkets were the most frequently patronized food purchasing outlets.
- Age showed a statistically significant association with nutritional status ($p < 0.05$).

**BACKGROUND AND OBJECTIVE**

Adolescence is a critical stage of rapid physical growth and psychosocial development accompanied by increased nutritional requirements. During this period, food purchasing behaviours become increasingly independent and substantially influence dietary choices and nutritional status. Poor food purchasing practices may encourage the consumption of energy-dense, nutrient-poor foods, thereby increasing the risk of undernutrition, overweight, obesity, and other nutrition-related non-communicable diseases [1, 2]. Although adolescents increasingly make independent food purchasing decisions, evidence on their purchasing patterns and nutritional status in tertiary institutions in Nigeria remains limited. This study assessed food purchasing patterns and nutritional status among adolescents in Federal Polytechnic Ilaro, Ogun State.

**MATERIALS AND METHODS**

A school-based cross-sectional descriptive study was conducted among 400 adolescents attending the Federal Polytechnic Ilaro, Ogun State. Respondents were selected using a multistage sampling technique. Data were collected using a pretested semi-structured interviewer-administered questionnaire to obtain information on socio-demographic characteristics and food purchasing patterns. Weight and height were measured using standard anthropometric procedures, while nutritional status was assessed using the WHO Growth Reference based on Height-for-Age (HAZ) and BMI-for-Age (BAZ) Z-scores. Data were analysed using IBM SPSS version 27.0. Descriptive statistics were presented as frequencies and percentages, while Chi-square analysis examined associations between selected variables. Statistical significance was considered at $p < 0.05$.

**RESULTS AND DISCUSSION**

The majority were females (77.0%), aged 19 years (55.3%), and had parents with tertiary education and monthly incomes above ₦21,000. Assessment of nutritional status revealed that 72.5% had normal height-for-age, whereas 22.5% were mildly stunted, 4.0% moderately stunted and 1.0%

severely stunted. Regarding BMI-for-age, 61.3% had normal nutritional status, 32.8% were overweight, 4.0% were obese and 2.0% were underweight. Food purchasing assessment showed that 38.8% had never patronized local restaurants, whereas 30.3% visited local restaurants one to two times weekly. Approximately 35.0% purchased food from supermarkets one to two times weekly, while 29.5% never visited supermarkets. More than half (52.0%) had never patronized fast-food outlets, whereas 27.3% purchased food from local markets one to two times weekly, indicating that local markets remained the predominant food source.

The prevalence of overweight and obesity observed in this study was higher than reported among adolescents in Lagos, where overweight and obesity were 13.4% and 7.0%, respectively [3]. However, the coexistence of overnutrition and stunting in the present study is consistent with evidence of a double burden of malnutrition among Nigerian adolescents. Previous studies have similarly reported the simultaneous occurrence of undernutrition and overnutrition among Nigerian children and adolescents [4]. These findings highlight the need for adolescent nutrition interventions that address both forms of malnutrition.

## CONCLUSION AND RECOMMENDATIONS

Most adolescents had normal nutritional status; however, overweight, obesity and mild stunting remain important nutritional concerns. Local markets and supermarkets were the major sources of purchased foods, while fast-food patronage was relatively low. Nutrition education programmes should promote healthier food purchasing behaviours and encourage increased consumption of nutrient-dense foods among adolescents. Institution-based nutrition interventions and regular nutritional screening are recommended to improve adolescent health outcomes.

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Theme/sub-theme: Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, & Sectors /Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-based Protocols with Health System Delivery

# Evaluation of the Prevalence of Obesogenic Risk Factors and Nutritional Status of Young Adults in Ota State Hospital, Ogun State, Nigeria

Olutayo, K. O[1], Alayande I.R [1], Omotayo O. J[1], Akinseye O. B[1] and Lessor J. O[1]

[1]Department of Food Science and Technology, Bells University of Technology, Ota,Ogun State Nigeria.

*Corresponding author, e-mail: kolawoleolutayo@gmail.com, +2348030433156

Keywords: Obesity; obesogenic risk factors, nutritional status

**Highlights:**

- Poor diet, stress, and poor sleep drive risk
- Majority of the respondents have normal BMI status.
- Employment status affects fresh fruit access.

**BACKGROUND AND OBJECTIVES:** Obesity is an escalating public health concern among young adults in low-to-middle-income communities, and this study assessed the nutritional status and prevalence of obesogenic risk factors among young adults at State Hospital in Ota, Ogun State, Nigeria [1,2].

**MATERIALS AND METHOD:** This cross-sectional study evaluated 95 young adults by analyzing socio-demographic, dietary, lifestyle, and anthropometric parameters using descriptive statistics and chi-square tests ($p < 0.05$).

**RESULTS AND DISCUSSION:** The majority of them are predominantly young, low-income earners with a normal BMI. Significant proportions exhibited overweight and obesity risks driven by unhealthful dietary patterns, sedentary lifestyles, psychosocial stress, and employment status as socioeconomic barrier to fresh produce access [1,2].

**Table 1: Relationship among Socioeconomic characteristics, Anthropometric indices and Obesogenic risk factors**

| S/N | Variables | Obesogenic Risk Factors | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sedentary screen time | | | Means of transportation | | | Sleep on average | | | Stress | | | Accessibility to fresh produce | | |
| | | $X^2$ | df | p-value | $X^2$ | Df | p-value | $X^2$ | df | p-value | $X^2$ | df | p-value | $X^2$ | df | p-value |
| 1 | **Age** | 27.225 | 18 | 0.075 | 22.100 | 18 | 0.228 | 35.768 | 18 | 0.008 | 22.227 | 24 | 0.566 | 27.268 | 24 | 0.292 |
| 2 | **Sex** | 5.262 | 3 | 0.154 | 1.791 | 3 | 0.617 | 6.637 | 3 | 0.084 | 1.185 | 4 | 0.881 | 1.304 | 4 | 0.861 |
| 3 | **Marital Status** | 14.207 | 9 | 0.115 | 3.332 | 9 | 0.950 | 6.068 | 9 | 0.733 | 6.274 | 12 | 0.902 | 7.739 | 12 | 0.805 |
| 4 | **Education Level** | 7.409 | 9 | 0.595 | 19.183 | 9 | 0.024 | 4.712 | 9 | 0.859 | 2.893 | 12 | 0.996 | 18.136 | 12 | 0.112 |
| 5 | **Employ-ment Status** | 9.673 | 9 | 0.378 | 6.168 | 9 | 0.723 | 7.812 | 9 | 0.553 | 8.950 | 12 | 0.707 | 28.118 | 12 | 0.005 |
| 6 | **Monthly Income** | 6.717 | 12 | 0.876 | 11.456 | 12 | 0.490 | 15.103 | 12 | 0.236 | 20.028 | 16 | 0.219 | 17.180 | 16 | 0.374 |
| 7 | **Waist-Hip Ratio** | 0.786 | 3 | 0.853 | 1.951 | 3 | 0.583 | 0.560 | 3 | 0.905 | 1.580 | 4 | 0.812 | 2.480 | 4 | 0.648 |
| 8 | **Body Mass Index** | 6.138 | 9 | 0.726 | 7.963 | 9 | 0.538 | 5.892 | 9 | 0.751 | 9.588 | 12 | 0.652 | 9.740 | 12 | 0.639 |

**CONCLUSION AND RECOMMENDATİON(S):** Obesogenic risk factors such as unhealthy diets, inactivity, poor sleep, and prolonged sitting are widespread among young adults in this clinical setting, underscoring the urgent need for targeted nutrition education, physical activity promotion, and policy interventions to improve local food and built environments for effective obesity prevention.

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**Theme/sub-theme**: DELIVERING BETTER NUTRITION FOR ALL: Connecting the Dots Across Life Cycle, Systems, & Sectors.

**Title**: Diet Quality and Knowledge Regarding Breast Cancer Among Female Undergraduates in Ladoke Akintola University of Technology, Ogbomosho.

**Name of Author (s):** Akinremi, T.I[1], Akinlabi, F.O[1], Awotunde B.T[1], Ajibodu A.F[1], Ogunniran M.A[1], Oyekunle I.I[1].

**Affiliation of Author (s):** [1]Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.

*Corresponding Author:
Akinlabi F.O
Nutrition and Dietetics Department, Faculty of Food and Consumer Sciences,
Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.
fatihatakinlabi@gmail.com, +2348160856816.

**Keywords:** Female Undergraduates, Diet Quality, Breast Cancer, Knowledge

**Highlights**

- Most participants had poor breast cancer-related knowledge.
- Poor nutrition knowledge was prevalent among female undergraduates.
- Most respondents had low diet quality despite favorable WHR profiles.

**BACKGROUND AND OBJECTİVES**
Breast cancer remains one of the leading causes of cancer-related morbidity and mortality among women globally and in Nigeria, with poor dietary practices and inadequate awareness of modifiable risk factors contributing significantly to disease burden. This study assessed diet quality and breast cancer knowledge among female undergraduates in Ladoke Akintola University of Technology (LAUTECH), Ogbomoso, Nigeria.

**METHOD**
A descriptive cross-sectional study design was employed using a multistage sampling method recruiting 525 respondents aged 16-24 years. Structured interviewer-administered questionnaire, anthropometric assessment, and Diet Quality Questionnaire (DQQ) were administered for data collection. Waist and hip circumferences were measured and waist-to-hip ratio(WHR) was calculated and classified as low risk (<0.80), moderate risk (0.81–0.85), or high risk (>0.86). Breast cancer-related and nutrition knowledge were assessed using 17 knowledge questions, with scores classified as poor (0–8) or good (9–18). using Data were analyzed using descriptive and inferential statistics with significance at $p< 0.05$.

**RESULTS AND DISCUSSION**
Almost three quarter (73.7%) of the respondents had poor knowledge breast cancer prevention and risk factors while (26.3%) had good knowledge. This finding is similar to Coleman *et al.*, 2023 [1] who reported students' breast cancer knowledge globally is inadequate.

Similarly, **68.3%** of the female undergraduates had poor nutrition knowledge related to breast cancer risk reduction. This finding highlights a substantial gap in nutrition knowledge among the study population. Deeb *et al.* (2024) [2] similarly reported inadequate nutrition knowledge, attitudes, and lifestyle practices related to breast cancer risk reduction, suggesting the need for improved nutrition education among young adults.

There is a statistically significant association between the faculty of the respondents and their knowledge level (p=0.007). However, marital status, year of study, waist-hip ratio status and diet quality has no association (p>0.05) with knowledge level

Further to this, majority (71.8%) had low diet quality, while 28.2% had high diet quality.

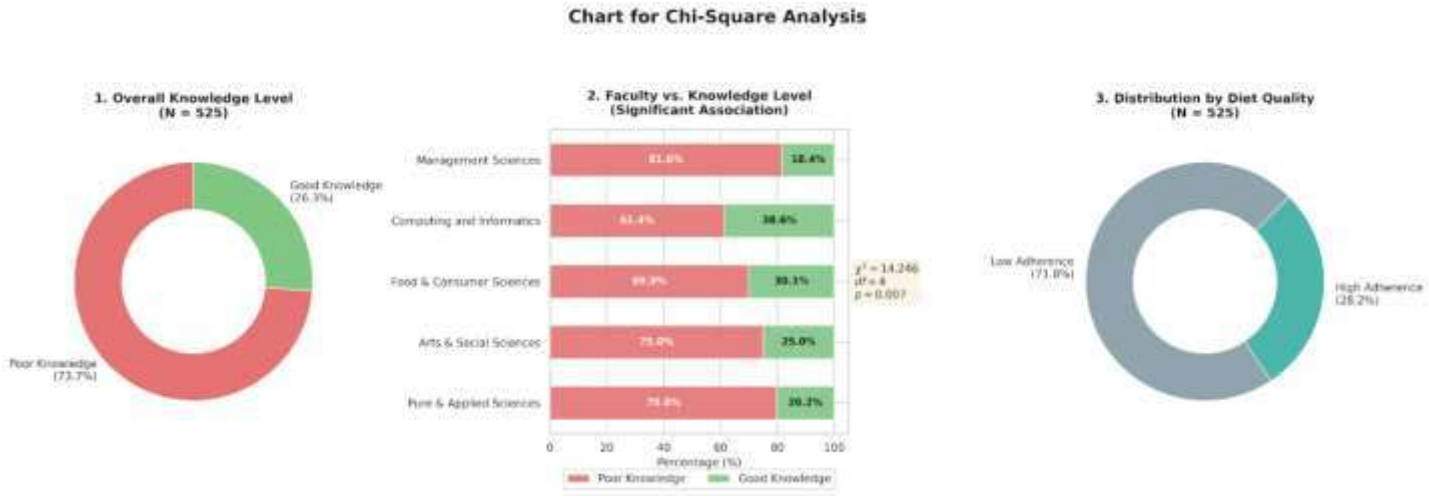



Fig 1: Chi square analysis of Factors Associated with Knowledge (N = 525)

## CONCLUSION AND RECOMMENDATİON

While female undergraduates in LAUTECH according to these findings may demonstrate relatively favorable WHR profiles, their suboptimal knowledge and poor diet quality highlights the need for targeted nutrition interventions in the university to improve breast cancer prevention knowledge and promote healthier dietary practices.

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**Sub-Theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

# Title: Nutritional and Health Challenges Among Adolescents in Imo State: Risk Factors and Opportunities for Sustainable Development

**Name of Author(s)**:[*]Okwulehie, F. C., [1]Olubiyi E, O. [1], Ukozor,AUC [1], & .Ukwujiagu C.U[1]

**Affiliation of Author(s):[1]**Department of Home Economics and Hospitality Management, Alvan Ikoku Federal University of Education, Owerri, Nigeria.
[*]Corresponding Author: Phone: +234 803 342 3174 Email: tonyokwulehie@yahoo.com

**Keywords:** Nutrition, Health, Challenges, Adolescents

**Highlights:**

- Adolescents in Imo State face several nutritional and health challenges
- A positive relationship exists between adolescents' nutritional and health status and sustainable development in Imo State ($r = 0.279$).
- The coefficient of determination ($r^2 = 0.08$) indicates that nutritional and health status explains 8% of the variation in sustainable development

**BACKGROUND AND OBJECTIVES:** Adolescents constitute about 16% of the global population, representing approximately 1.3 billion people worldwide [1]. This stage is characterized by rapid physical, psychological, and social development, resulting in increased nutritional requirements. However, many adolescents remain vulnerable to under-nutrition, micronutrient deficiencies, overweight, and obesity due to poor dietary habits and other lifestyle factors [2]. Despite the importance of adolescent nutrition for lifelong health and sustainable development, their nutritional needs receive limited attention in many health programmes. In Nigeria, evidence on adolescent nutritional and health challenges, particularly in Imo State, is scarce, with most studies focusing on younger children and pregnant women.

**MATERIALS AND METHODS:** A descriptive survey design was adopted for the study. The research was conducted among adolescents enrolled in the 2025–2026 Cohort 4 of the Skill-Up Imo Programme across the 27 Local Government Areas of Imo State, Nigeria. From a population of 36,000 participants, a sample of 421 respondents was selected using a multistage sampling technique. Data were collected using a structured questionnaire with a Cronbach's Alpha reliability coefficient of 0.91. Mean and standard deviation were used to answer Research Questions One and Two, while Pearson Product Moment Correlation was used to answer Research Question Three and test the hypothesis at the 0.05 level of significance.

## RESULTS AND DISCUSSION

*Table 1: Relationship between the Nutritional and Health Status of Adolescents and the Promotion of Sustainable Development in Imo State (N = 421)*

| Variables | N | Mean | SD | r | $r^2$ | $r^2$ (%) | Decision |
|---|---|---|---|---|---|---|---|
| *Nutritional and Health Status of Adolescents* | 421 | 1.39 | 0.09 | 0.279 | 0.08 | 8.00 | Positive Relationship |
| *Promotion of Sustainable Development* | 421 | 65.86 | 15.62 | | | | |

Nutritional and health status showed a positive but weak relationship with sustainable development ($r = 0.279$; $r^2 = 0.08$), explaining 8% of its variation. The findings underscore the influence of personal, family and socioeconomic factors on adolescent nutrition and suggest that improving adolescent health may contribute to human capital development, although sustainable development is determined by several other factors.

**CONCLUSION AND RECOMMENDATION:** Adolescents in Imo State face multiple nutrition and health challenges influenced by personal, family and socioeconomic factors. The positive but weak association with sustainable development highlights the need for greater investment in adolescent health and nutrition. Government and stakeholders should strengthen nutrition education, health screening, healthy diets, physical activity and hygiene, while addressing unhealthy snacking, restrictive dieting, poor nutrition knowledge and peer influence.

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**Theme/Sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

# Water Stress Information And Water Consumption Pattern Among Students Of Moshood Abiola Polytechnic, Abeokuta And Federal Polytechnic, Ilaro, Ogun State, Nigeria

***Lam, F. J.[1], Ilori, O. A.[1], Akinsanya A. O.[2], Olufelo A. T[3].**

[1]Department of Nutrition and Dietetics, Moshood Abiola Polytechnic, Abeokuta, Ogun State.

[2]Salawu Abiola Memorial Library, Moshood Abiola Polytechnic, Abeokuta Ogun State.

[3]National Biotechnology Development Agency, Abuja

*Corresponding author, e-mail: lamjoy0815@gmail.com, +2347089061577

**Keywords:**

Water stress, Water consumption pattern, Hydration status, Polytechnic students

## BACKGROUND AND OBJECTIVES

Water is a vital element for the existence and sustainability of all living forms on Earth, making it a significant environmental component. As a result, the need for water is growing due to various anthropogenic influences, rapid rates of population expansion, and growing urbanization [1]. Tertiary students are an overlooked life stage in nutrition research despite lifestyle factors influencing hydration behaviors. Water stress refers to a situation where water demand places pressure on available fresh resources resulting in inadequate water availability for human and environmental needs[2].This study assessed water stress information and water consumption pattern among students of Moshood Abiola Polytechnic (MAPOLY) Abeokuta, and Federal Polytechnic, Ilaro (FPI), Ogun State, alongside their socio-demographic and nutritional status and awareness of water's importance.

## MATERIALS AND METHOD

A cross-sectional study was conducted among 270 randomly selected undergraduate students from five schools each in MAPOLY and FPI, using two-stage sampling random selection of departments, then proportionate stratified and lottery sampling of respondents. A semi-structured questionnaire captured socio-demographic data, anthropometry, water consumption pattern, using urination frequency, urine color, dehydration-related symptoms (headache, fatigue, dizziness, dry mouth). Data were analyzed using SPSS version 22, with descriptive statistics and Chi-square test of association.

## RESULTS AND DISCUSSION

**Water Consumption Pattern:** Respondents' ages ranged from 16 to above 25 years (16-20 years: 22.2%; 21-25 years: 51.1%; above 25 years: 26.7%). Water intake was largely inconsistent and below optimal levels across volume categories. For 50 cl servings, most respondents (42.2%) drank only 2-3 times daily; for 100 cl, 43.7% drank 4-5 times daily, with few reaching 8-10+ times daily. Even at higher volumes (200-300 cl), the largest share still drank only 2-3 times daily (36.3% and 45.6%, respectively), indicating infrequent consumption regardless of serving volume. Awareness of water's health benefits was high (90.7-99.3%), yet this did not consistently translate

into adequate consumption habits, echoing findings that awareness alone rarely predicts hydration behavior in young adults [3].

**Water Stress Indices:** Indicators of water stress and hypohydration were common. Nearly half (44.8%) urinated fewer than four times daily and 27.0% had dark yellow/amber urine, classic markers of insufficient hydration [4]. 46.7% experienced headache, 23.7% fatigue, 16.7% dizziness, and 13.0% dry mouth. Diagnosed conditions included urinary tract infection (39.3%), kidney stones (20.4%), and heat exhaustion (7.0%). Psychosocial stress was evident, with 44.5% often/always anxious about clean water access. A significant association was found between 100 cl water consumption and BMI (p=0.001), with insufficient water intake linked to increased risk of overweight and obesity, consistent with water's role in metabolism and satiety. Reduced urination frequency and dark urine color were confirmed as reliable behavioral indicators of water stress [4].

**Table 1: Selected Indicators of Water Consumption Pattern and Water Stress among Respondents**

| Variables | Frequency | Percentage(%) |
|---|---|---|
| Drank 100 cl of water 4-5 times daily | 118 | 43.7 |
| Drank 300 cl of water only 2-3 times daily | 123 | 45.6 |
| Urinated fewer than 4 times daily | 121 | 44.8 |
| Dark yellow/amber-coloured urine | 73 | 27.0 |
| Headache in the past week | 126 | 46.7 |
| Diagnosed with urinary tract infection | 106 | 39.3 |
| Diagnosed with kidney stones | 55 | 20.4 |
| 100 cl water consumption vs BMI (Chi-square, *sig.) | - | p=0.001 |

## Conclusion And Recommendation(S)

This study revealed considerable water stress among MAPOLY and FPI students, marked by inconsistent intake and dehydration-related health conditions despite good awareness of water's importance. Institutions should improve water infrastructure, promote hydration education, and encourage consistent water consumption to reduce water stress and its health risks.

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Theme/Sub-theme: Adolescent Nutrition and Health: Characteristics, Risk factors and Opportunities of an Overlooked Life Stage

Title: Nutritional Status and Dietary Characteristics of Female Adolescents in Cross River State, Nigeria.

Authors: *Otu[1], K. A., Ene-Obong[2], H. N., Eteng[3], M.U

[1]Department of Midwifery, Nutrition and Dietetics Unit College of Nursing Sciences, Calabar

[2]Department of Human Nutrition and Dietetics, University of Calabar, Calabar

[3]Department of Biochemistry, University of Calabar, Calabar.

*Corresponding author, e-mail: kathryn-usor@unical.edu.ng, +2348066213771

## BACKGROUND AND OBJECTIVES

Despite growing attention to adolescent nutrition, evidence on the nutritional status and dietary characteristics of female adolescents in Nigeria remains limited, particularly at the sub-national level. This study assessed the nutritional status and dietary characteristics of female adolescents in Cross River State, Nigeria.

Keywords: Female adolescents; Nutritional status; Dietary diversity; Nigeria

**Highlights**

- Double burden of malnutrition was observed among female adolescents.
- Moderate dietary diversity predominated among the study population.
- Most adolescents maintained normal BMI-for-age despite nutritional challenges.

## MATERIALS AND METHODS

A community-based cross-sectional study was conducted among 558 female adolescents aged 10–19 years selected through a multistage sampling technique from in-school and out-of-school populations across Cross River State. Information on socio-demographic characteristics and dietary practices was collected using interviewer-administered structured questionnaires. Weight and height were measured using standard procedures, and nutritional status was assessed using Body Mass Index-for-age (BAZ) and Height-for-age Z-score (HAZ) based on the WHO Growth Reference for children and adolescents aged 5–19 years [1]. A 24-hour dietary recall was conducted, although not for the complete sample size in this study. Dietary diversity was assessed from the 24-hour dietary recall, using the Individual Dietary Diversity Score (IDDS) following the Food and Agriculture Organization (FAO) guidelines [2]. Complete dietary information for dietary-diversity assessment was available for 330 participants, who were included in the dietary diversity analysis. Descriptive statistics summarized continuous and categorical variables, while Pearson's Chi-square test examined associations between schooling status and selected dietary practices. Statistical significance was set at $p < 0.05$.

## RESULTS AND DISCUSSION

The respondents were predominantly aged 10–14 years (60.6%), more than half resided in urban areas (55.2%), and most belonged to monogamous households (76.9%). Household sizes of four to six persons were most common (65.2%).

**Table 1: Anthropometric characteristics of the female adolescents**

| Variable | Value |
|---|---|
| **Mean Values** | |
| Height | 153.58 ± 9.45 |
| Weight | 42.91 ± 9.53 |
| BMI | 18.04 ± 3.03 |
| Height-for-Age Z-score (HAZ) | -0.60 ± 1.14 |
| BMI-for-Age Z-score (BAZ) | -0.75 ± 1.14 |
| **Prevalence rates** | |
| Severe thinness (BAZ < -3 SD) | 27 (4.8%) |
| Thinness (BAZ -3 SD ≤ BAZ < -2 SD) | 41 (7.3%) |
| Normal (-2SD ≤ BAZ ≤ +1 SD) | 469 (83.7%) |
| Overweight (+1SD < BAZ ≤ +2 SD) | 12 (2.1%) |
| Obesity (BAZ > +2 SD) | 6 (1.1%) |
| Normal Height ( HAZ ≥ -2 SD) | 503 (90.1%) |
| Moderate Stunting -3 SD ≤ HAZ < -2 SD | 38 (6.8%) |
| Severe Stunting (HAZ < -3 SD) | 16 (2.9%) |

Anthropometric results show that undernutrition remains an important public health concern. **Undernutrition was considerably more prevalent than overnutrition, with 12.1% of respondents classified as thin or severely thin compared with 3.2% who were overweight or obese.** Based on height-for-age, 90.1% of the respondents had normal linear growth, whereas 9.7% were moderately or severely stunted, reflecting the persistence of chronic undernutrition among a proportion of adolescents.

These findings demonstrate the coexistence of undernutrition and emerging overnutrition, consistent with the double burden of malnutrition increasingly reported among adolescents in low- and middle-income countries undergoing nutritional transition [3,4]. Although most adolescents maintained normal nutritional status, the prevalence of thinness and stunting suggests that nutritional deficiencies and inadequate dietary quality remain significant public health concerns. These findings underscore the need for nutrition-sensitive interventions that promote healthy dietary practices, improve dietary quality, and prevent both undernutrition and the rising risk of overweight and obesity during adolescence.

**Table 2: Dietary diversity of the female adolescents in Cross River State**

| Category | Frequency (%) |
|---|---|
| Low | 92 (27.9) |
| Moderate | 186 (56.4) |
| High | 52 (15.8) |
| **Total** | **330 (100)** |

More than half (56.4%) of the adolescents had moderate dietary diversity, whereas approximately one-quarter had low dietary diversity, suggesting that dietary quality remains suboptimal for many adolescents. Furthermore, dietary practices including meal skipping, fast-food consumption and eating outside the home differed significantly by schooling status. A higher proportion of out-of-school adolescents compared with their in-school counterparts, reported meal skipping (59.2%: 39.8%; $p < 0.001$), fast-food consumption (54.2%: 39.9%; $p = 0.009$), and eating outside the home at least twice weekly (42.7%: 17.9%; $p < 0.001$). As suggested by the findings, out-of-school female adolescents may be more likely to engage in dietary behaviours associated with poorer diet quality, indicating the need for targeted nutrition interventions for this vulnerable group. Highlighting the possible role of the educational setting in influencing dietary behaviours, patterns similar to that reported among adolescents undergoing nutrition transition in sub-Saharan Africa [4,5].

## CONCLUSION AND RECOMMENDATIONS

Female adolescents in Cross River State experience a double burden of malnutrition, characterized by persistent undernutrition alongside emerging overweight and obesity. Although most adolescents exhibited normal nutritional status, low dietary diversity and unhealthy dietary practices remain common. School- and community-based nutrition interventions should promote dietary diversity, healthy eating behaviours and nutrition education, particularly among vulnerable adolescent populations. Strengthening adolescent nutrition programmes should form an integral component of public health and school health policies in Nigeria.

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Theme/Sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

Title: Food Purchasing Behaviour and Dietary Diversity among In-School Adolescents in Oluyole Local Government Area, Ibadan, Nigeria

Name of Authors: Lydia, C.C.[1], Shonibare, P.O.[2] and *Bodunde, I.O.[1]

Affiliations of Authors:

[1]Department of Human Nutrition and Dietetics, Lead City University, Ibadan, Oyo State.

[2]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Oyo State.

*Corresponding author, e-mail: bodunde.ifeoluwa@lcu.edu.ng, +2347064469979

Keywords: Food purchasing behaviour; dietary diversity; adolescents

Highlights

- 43.3% of adolescents had low dietary diversity.
- Sugar-sweetened beverages and snacks were frequently purchased.

**BACKGROUND AND OBJECTIVES**

Adolescence is a period of rapid growth with increased nutritional requirements [1]. Poor dietary quality among Nigerian adolescents remains a public health concern [2]. This study assessed food purchasing behaviour, dietary diversity and nutritional status among in-school adolescents.

**MATERIALS AND METHODS**

A cross-sectional study was conducted among 240 in-school adolescents aged 10–19 years from two public secondary schools using random and proportionate sampling. Data were collected using a structured questionnaire and 24-hour dietary recall. Dietary diversity was assessed across seven food groups, with one point per group; scores <4 and ≥4 indicated low and high dietary diversity, respectively [2]. Food purchasing behaviour was assessed by frequency of purchasing or bringing fresh fruits and vegetables, sugar-sweetened beverages, sweet snacks and savoury snacks from home, school and vendors, recorded as 0–5 days/week [3]. Weight and height were measured using standard procedures, and BMI-for-age determined. Data were analysed using descriptive statistics and Pearson's correlation ($p < 0.05$).

**RESULTS AND DISCUSSION**

Mean age was 13.36 ± 1.79 years and 54.6% were females. Low dietary diversity occurred in 43.3%; 74.6% had normal BMI-for-age, while 22.9% were underweight, 1.7% overweight and 0.8% obese (Table 1). Sugar-sweetened beverages and snacks were frequently purchased or

brought from home. Class correlated with sugar-sweetened beverage ($r = 0.258$, $p < 0.001$) and sweet snack purchases ($r = 0.135$, $p = 0.038$) in school. Food purchase responsibility correlated with bringing sugar-sweetened beverages from home ($r = -0.203$, $p = 0.002$), while pocket money access correlated with purchasing fresh fruits and vegetables ($r = 0.195$, $p = 0.003$) and savoury snacks ($r = 0.149$, $p = 0.022$) from vendors (Table 2). These findings support healthier school food environments and nutrition education [1,2].

Table 1: Selected characteristics and nutritional status of respondents

| **Variable** | **Result** |
|---|---|
| Access to pocket money | 65.3% |
| Low dietary diversity | 43.3% |
| High dietary diversity | 56.7% |
| Normal BMI-for-age | 74.6% |
| Underweight | 22.9% |
| Overweight | 1.7% |
| Obese | 0.8% |

Table 2: Significant correlations between adolescents' characteristics and food purchasing behaviour

| Predictor | Food purchasing behaviour | R | p-value |
|---|---|---|---|
| Class | Purchases of sugar-sweetened beverages in school | 0.258 | <0.001 |
| Responsibility for food purchases | Bringing sugar-sweetened beverages from home | -0.203 | 0.002 |
| Access to pocket money | Purchase of fresh fruits and vegetables from vendors | 0.195 | 0,003 |
| Access to pocket money | Purchase of savoury snacks from vendors | 0.149 | 0.022 |
| Class | Purchases of sweet snacks in school | 0.135 | 0.038 |

## CONCLUSION AND RECOMMENDATIONS

Despite predominantly normal BMI-for-age, 43.3% had low dietary diversity and 22.9% were underweight. Frequent purchasing of sugar-sweetened beverages and snacks was observed.

School-based nutrition education and healthier food environments are recommended.

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**Theme/Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Association between Dietary Patterns, Overweight and Menstrual Disorders among Female Undergraduates in a Tertiary Institution in Southwest Nigeria.

**Name of Authors:** Samuel, J.O.[1,2]; Rotimi, T.O.[1]; Roleola, E.M.[1]; Fadimu, E.O.[2]

**Affiliation of Authors**: [1]University College Hospital, Ibadan, Nigeria and [2]University of Ibadan, Ibadan, Nigeria

**Corresponding Author**: Samuel, J.O.; Sammyjoe.jbb@gmail.com; +2348033889478

**Keywords:** Dietary pattern; Menstrual disorders; Overweight; Female undergraduates

**Highlights**

- At least one menstrual disorder was reported by 95.1%
- Processed Food Dominant Dietary Pattern showed a significant association with menstrual disorders.

**BACKGROUND AND OBJECTIVES:** Menstrual disorders are common among young women and can affect wellbeing and academic functioning. A previous study (1) conducted at the University of Ibadan documented a high prevalence of menstrual disorders but did not examine their association with dietary pattern and overweight. This study assessed dietary patterns, overweight status, and menstrual disorders among female undergraduates and examined their associations.

**MATERIALS AND METHOD**: A descriptive cross-sectional study was conducted among 264 female undergraduates of the University of Ibadan selected through multistage sampling. A structured questionnaire assessed socio-demographic characteristics, food-consumption frequency and menstrual characteristics. Principal Component Analysis (PCA) was performed on food consumption frequency data, with three dietary patterns retained based on eigenvalues >1. Varimax-rotated factor loadings were used to identify the food groups that characterised each pattern, and factor scores were categorised into quartiles of adherence (Q1=lowest, Q2=low-moderate, Q3=moderate-high, Q4=highest). Pearson's chi-square and binary logistic was used to test associations between variables. Ethical approval was obtained from the UI/UCH Ethical Review Committee.

**RESULTS AND DISCUSSION**: Mean age was 19.96±2.47 years and mean age at menarche was 12.74±1.46 years. Majority (87.1%) of the respondents have normal BMI, while 11.0% were

overweight. At least one menstrual disorder was reported by 95.1%; dysmenorrhoea (86.0%), premenstrual syndrome (PMS) (55.7%), menorrhagia (6.8%), polymenorrhoea (18.2%), oligomenorrhoea (3.8%), and amenorrhoea (12.5%). Menstrual symptoms included abdominal pain (86.0%), mood changes/depressed mood (36.0%), loss of appetite (28.0%), headache (26.9%), dizziness (24.6%), vomiting (20.5%), difficulty concentrating (17.0%) and breast tenderness (12.5%). Awareness of menstrual disorders was 69.3%, only 10.2% had ever consulted a gynaecologist for menstrual problems, 8.0% reported a family history of menstrual disorders, and respondents described menstrual pain as tolerable (50.4%), requiring treatment (26.5%) or normal (23.1%). Principal Component Analysis identified three dietary patterns. a Highly Diversified Dietary Pattern, Plant-based Dietary Pattern, and a Processed Food Dominant Dietary Pattern.

Processed Food Dominant Dietary Pattern was significantly associated with BMI status (p=0.006). Age-adjusted logistic regression showed that respondents in Q3 (aOR=9.27, p=0.043) and Q4 (aOR=14.00, p=0.014) of Processed Food Dominant Dietary pattern had significant higher odds of being overweight compared to those in Q1. Compared with Q1, respondents in Q2 of the Processed Food Dominant Dietary Pattern had higher odds of having PMS (aOR=2.62, p=0.012), while respondents in Q4 of the Highly Diversified Dietary Pattern had lower odds of having menorrhagia (aOR=0.19, p=0.046). The Processed Food Dominant Dietary Pattern (Q4) was associated with higher odds of having polymenorrhoea (aOR=3.48, 95%CI: 1.32-9.15, p=0.011). Overweight was not significantly associated with any of the menstrual disorders (p>0.05).

The high burden of menstrual disorders is consistent with earlier findings from the same university [1]. The associations observed between processed-food intake and menstrual disorders are also consistent with emerging evidence that link dietary patterns with menstrual outcome [2].

**CONCLUSION AND RECOMMENDATION(S)**

Menstrual disorders were highly prevalent. Greater adherence to a processed-food dominant pattern was associated with overweight and some menstrual disorders. Nutrition and reproductive-health programmes should promote healthier food choices, menstrual-health awareness and appropriate clinical assessment of persistent symptoms. Larger longitudinal studies are recommended.

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**Theme/Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Development and Validation of Culturally Appropriate Calcium Nutrition Education Tools for Adolescents and Young Adults in Ibadan, Nigeria

**Name of Authors:** *Shonibare, P.O.[1] and Folasire O.F. [1, 2]

**Affiliation of Authors:**

[1]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Oyo State, Nigeria

[2]Family Medicine Department, University College Hospital, Ibadan, Oyo State, Nigeria.

*Corresponding author, email: praiseshonibare@gmail.com, +2348106907303

**Keywords:** Calcium nutrition; Nutrition education; Educational materials

**Highlights**

- Developed a culturally appropriate booklet and tri-fold brochure for calcium education.
- Expert and user validation demonstrated excellent acceptability.
- Booklet and tri-fold brochure are suitable for school and community nutrition education.

## BACKGROUND AND OBJECTIVES

Adequate calcium intake during adolescence and young adulthood is essential for optimal bone health. However, evidence from Nigeria indicates inadequate calcium intake, poor calcium knowledge and infrequent consumption of calcium-rich foods among adolescents and young adults, highlighting the need for effective nutrition education resources and interventions [1,2]. This study developed and validated culturally appropriate calcium nutrition education materials for adolescents and young adults in Ibadan, Nigeria.

## MATERIALS AND METHODS

A methodological study was conducted among experts and adolescents/young adults in Ibadan, Nigeria. A booklet and tri-fold brochure were developed based on the Health Belief Model and following established procedures for developing and validating nutrition education materials [3]. Content validity was assessed by ten (10) nutrition experts using the Scale-Level Content Validity Index based on Average (S-CVI/Ave) and Universal Agreement (S-CVI/UA). Face validity was evaluated among thirty adolescents and young adults using a structured questionnaire assessing clarity, attractiveness, comprehension, cultural appropriateness and usefulness. Descriptive statistics summarised validation scores, while participants' comments were analysed thematically.

## RESULTS AND DISCUSSION

The educational materials demonstrated excellent content and face validity. The overall content validation yielded an S-CVI/Ave of 0.96, an S-CVI/UA of 0.83 and a mean validation score of 3.23 ± 0.33, indicating excellent agreement among expert reviewers. Face validation was also favourable, with overall agreement of 94.9% for the booklet and 99.5% for the tri-fold brochure. Participants described the materials as easy to understand, visually appealing, culturally appropriate and useful. The inclusion of familiar local foods and simple language enhanced understanding of calcium nutrition. These findings are consistent with previous studies reporting high acceptability of well-designed nutrition education materials following expert and user validation [3].

**Table 1: Summary of validation outcomes for the calcium nutrition education materials**

| Validation parameter | Booklet | Tri-fold brochure | Overall |
|---|---|---|---|
| S-CVI/Ave | 0.96 | 0.98 | 0.96 |
| S-CVI/UA | 0.80 | 0.85 | 0.83 |
| Face validation agreement (%) | 94.9 | 99.5 | — |

## CONCLUSION AND RECOMMENDATION:

The validated booklet and tri-fold brochure demonstrated excellent content and face validity, supporting their suitability for calcium nutrition education among adolescents and young adults in schools, universities and community settings. Future intervention studies should evaluate their effectiveness in improving calcium knowledge and dietary practices.

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# SUB-THEME 4: POSTER

**Subtheme:** Adolescent Nutrition and Health

**Title:** Assessment of Nutritional Status, Food Consumption Pattern and Short Chain Fatty Acids among Adolescent School Girls in Igabi LGA, Kaduna State

**Author (s)**: Abdullahi Haruna [1, 2], Uche Samuel Ndidi[1], Abdullahi Balarabe Sallau[1], Sani Ibrahim[1], Abbas Olagunju [1]

**Affiliation Author (s)** [1]Department of Biochemistry, Faculty of Life Sciences, Ahmadu Bello University, Zaria-Nigeria
[2]Department of Human Nutrition and dietetics, Faculty of Food Science and Technology, Federal University of Agriculture, Mubi, Nigeria

***Corresponding author: Haruan Abdullahi; get2haruna@gmail.com**

**Keywords:** Socio-demographic, Dietary Diversity, Short Chain Fatty Acid, Food Consumption

**Highlights**

• There is relationship between higher SCFA-producing bacteria to greater dietary diversity, nutritional status and better socio-demographic characteristics.

• Study showed a higher prevalence of stunting and underweight in public schools, while slightly higher overweight and obesity in private schools were observed.

• SCFAs demonstrated significantly lower concentrations in public schools compared with private schools.

**Abstract:**

**Background and Objectives:**

Proper nutrition practices is critical during adolescence since it is the second opportunity to catch up growth, and have a strong effect on lifetime nutritional status and health of the adolescent. This study was to assess the nutritional status, food consumption pattern, and short chain fatty acids among adolescent school girls in Igabi LGA, Kaduna State, Nigeria.

**Materials and Methods:**

Materials used for this study include; validated semi structure questionnaire, writing materials, electronic digital weighing balance, standiometer, and high performance liquid chromatographic (HPLC). Validated semi structure questionnaire were used to assess socio-demographic characteristics and food consumption pattern of Adolescent school girls, Anthropometric indices were obtained to assess Nutritional status and Short Chain Fatty Acids were quantified from the feacal sample collected from Adolescent school girls.

**Results and Discussion:**

Table 1: Nutritional Status Distribution of Adolescent School Girls in Igabi LGA, Kaduna State (n=229)

| Nutritional Status | School Type | | |
|---|---|---|---|
| | Public n(%) | Private n(%) | Total n(%) |
| Stunting (<-3SD) | 40(32%) | 20(19%) | 60(26%) |
| Normal Height (<-2SD) | 80(63%) | 75(73%) | 155(68%) |
| Underweight (<-3SD) | 35(28%) | 15(15%) | 50(22%) |
| Normal Weight (>-2SD) | 70(56%) | 70(68%) | 140(61%) |
| Overweight (>+1SD) | 15(12%) | 10(10%) | 25(11%) |
| Obese (>+2SD) | 6(5%) | 8(8%) | 14(6%) |

**Discussion, Conclusion and Recommendation**

A cross-sectional study was conducted among 229 adolescent girls (mean age ≈ 15 years) attending public (n = 126) and private (n = 103) secondary schools in Nigeria. The study revealed that private-school participants were slightly older (15.8 ± 1.7 public vs 15.4 ± 1.9 years private), more likely to be Hausa (55% private vs 63% public), and came from households with higher parental education (49 % vs 24 % tertiary) and lower family-size extremes which vary with the study conducted by (1). Finding of this study showed a higher prevalence of stunting (32% public vs 19% private), our study is not similar with a study carried out by (2). These findings underscore that nutritional variables co-vary with a SCFAs profile, suggesting that integrated school-based nutrition and counselling interventions could narrow the health gap between public and private school adolescents in Nigeria (3).

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**Theme/Sub-theme:**

Adolescent Nutrition and Health Characteristics, Risk Factors and Opportunities for an Overlooked Life Stage

**Title:**

Nutrition and Health Risk Behaviours among Adolescents in Secondary Schools of Katsina State, Nigeria: Implications for Lifelong Health Outcomes

Name of Author(s):

*Tukur, M.J.[1] and Rabiu, I.[2]

**Affiliation of Author(s):**

[1]Department of Physical and Health Education, Isa Kaita College of Education, Dutsin-Ma, Katsina State, Nigeria.

[2]Department of Physical and Health Education, Sa'adatu Rimi College of Education, Kunbotso, Kano

*Corresponding author, e-mail: mjamilutukurikcoe@gmail.com, +2348037785181

**Keywords:**

Adolescents; Nutrition; Health Behaviour; Secondary School Students

**Highlights**

• Poor dietary habits were prevalent among adolescents

• Nutrition knowledge significantly influenced food choices

• School health education interventions can improve adolescent health outcomes

## BACKGROUND AND OBJECTIVES

Adolescence is a critical stage of rapid physical, psychological and cognitive development that significantly influences future health outcomes. A systematic review by Gabriel et al. [1] reported that unhealthy dietary practices, inadequate dietary diversity and sedentary behaviours are increasingly common among adolescents in Nigeria. This study therefore aims to assess nutrition and health characteristics, identified associated risk factors and highlighted opportunities for promoting healthy behaviours among secondary school adolescents in Nigeria.

## MATERIALS AND METHOD

A descriptive cross-sectional study design was adopted for the study. The study population comprised 250 secondary school students aged 12–19 years selected from public secondary schools in Katsina State, Nigeria using a multistage sampling technique. Data were collected using

a structured and validated questionnaire containing sections on socio-demographic characteristics, dietary practices, physical activity patterns and health-related behaviours.

## RESULTS AND DISCUSSION

The findings revealed that unhealthy dietary practices were common among adolescents. More than half of the respondents (64%) skipped breakfast regularly, while a large proportion (56%) frequently consumed sugar-sweetened beverages. The nutritional assessment revealed the coexistence of undernutrition and overweight among adolescents, indicating the growing double burden of malnutrition in developing countries. These findings are consistent with the systematic review conducted by Abubakar et al. [2], which reported poor dietary quality and inadequate nutrient intake among Nigerian adolescents. Similarly, Gabriel et al. [1] observed that unhealthy dietary behaviours and malnutrition remain widespread among adolescents in Nigeria. Gabriel et al. [1] emphasized that adolescent nutrition in Nigeria remains under-researched despite increasing evidence of nutritional challenges among school-aged children and adolescents.

## CONCLUSION

Adolescents are vulnerable to multiple nutritional and health-risk behaviours that may adversely affect their present and future wellbeing.

Therefore, it is recommended that there should be a comprehensive school-based nutrition interventions, strengthened health education programmes and supportive policies that encourage healthy eating and active lifestyles among adolescents.

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1. **Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Ultra-Processed Food Consumption and Emotional Regulation Difficulties Among Adolescents: A Scoping Review

**Name of Author (s):** Akinade E. Ogunniyi[1]*, Eunice A. Olorunfemi[2], Ifeoluwanimi A. Bolarinwa[1], Folashade R. Sikiru[3], Akinyera A. Karamot[3], Oluwaferanmi Olatilo[4] and Genevieve Awuah-Cobbinah[5]

**Affiliation of Author (s):** [1] Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

[2] Department of Human Kinetics and Health Education, Faculty of Education, University of Lagos, Lagos, Nigeria

[3] Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture Abeokuta, Ogun State, Nigeria

[4] Department of Pathology, International Institute of Tropical Agriculture, Ibadan, Oyo State, Nigeria

[5] Department of Clinical Nutrition and Dietetics, School of Allied Health Sciences, College of Health and Allied Sciences, University of Cape Coast, Ghana

**Correspondence:** Akinade E. Ogunniyi; enochakinade4@gmail.com

**Keywords:** Adolescents, ultra-processed foods, emotional regulation, mood instability, stress reactivity, internalizing symptoms, nutrition and mental health.

**Highlights**

- Ultra-processed food intake is increasingly relevant to adolescent nutrition and mental health outcomes.
- Evidence links higher UPF consumption with emotional dysregulation indicators, including irritability, mood instability and stress reactivity.
- Nutrition-sensitive adolescent interventions should combine healthier food environments with mental health promotion.

**Background and Objectives:**

Ultra-processed foods (UPFs) are becoming a major part of adolescents' diets globally and are commonly characterised by high levels of refined sugars, unhealthy fats, additives and low nutrient density. Emerging evidence links UPF consumption with adolescent mental health outcomes such as depression, anxiety and internalising symptoms [3]. However, evidence focusing specifically on emotional regulation difficulties remains insufficiently mapped. This scoping review examined the relationship between UPF consumption and emotional regulation difficulties among adolescents aged 10-19 years, with attention to irritability, mood instability, emotional dysregulation, stress reactivity and related outcomes.

**Materials and Method:**

A scoping review design was used to systematically map global evidence on UPF consumption and emotional regulation among adolescents. The review followed Arksey and O'Malley's [1] methodological framework, enhanced by Levac et al., [2] and was reported in line with PRISMA-ScR guidance [4]. Searches were conducted across PubMed, Scopus, Web of Science, PsycINFO, Embase and CINAHL without date restrictions. 15 Eligible studies included quantitative, qualitative and mixed-methods research assessing UPF intake using the NOVA classification or comparable measures alongside emotional regulation-related outcomes. Data were extracted, charted and synthesised narratively.

**Results and Discussion:**

The evidence indicates that higher ultra-processed food (UPF) consumption is associated with poorer emotional regulation outcomes among adolescents, including heightened irritability, impaired mood stability, increased stress responsiveness, and internalising symptoms [5] The mapped literature suggests several plausible pathways linking UPF exposure to emotional dysregulation, including inflammation, glycaemic instability, endocrine disruption, gut–brain axis changes, and potential neurochemical effects of food additives [6]. Findings also show that adolescent UPF consumption is shaped by wider food environments, marketing exposure, convenience, peer influence, and affordability, indicating that emotional regulation difficulties cannot be addressed through individual behaviour change alone but require broader food-system and policy interventions [7].

**Conclusion and Recommendation:**

UPF consumption may contribute to emotional regulation difficulties among adolescents, although evidence remains heterogeneous and requires stronger longitudinal and context-specific research. Nutrition and mental health programmes for adolescents should integrate dietary quality, food literacy and emotional wellbeing components. Schools, families and policy actors should prioritise healthier food environments, restriction of unhealthy food marketing to young people, and interventions that reduce dependence on energy-dense, nutrient-poor foods. Further research is recommended in African settings, where adolescent diets are changing rapidly but evidence on UPFs and emotional regulation remains limited.

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**SUB-THEMES: ADOLESCENT NUTRITION AND HEALTH:**

# Adolescent Nutrition and Health in the 21st Century: Challenges, Determinants, and Intervention Opportunities

Ali A.I.*[1] and Hussain B.H.[2]
[1and 2] Department of Food Science and Technology, Aliko Dangote University of Science and Technology, Wudil, Kano-Nigeria
[2] Department of Public Health, National Open University of Nigeria
Corresponding author: aishaidrisali@gmail.com Tel: +2348027545409

**Keywords:** Adolescents; Nutrition; Diet quality; Obesity

**Highlights**

- Poor diet quality remains highly prevalent among adolescents globally
- Micronutrient deficiencies and obesity coexist during adolescence
- Food policy interventions can improve adolescent nutrition outcomes

**BACKGROUND AND OBJECTIVES:** Adolescence is a critical developmental stage characterized by rapid physical, cognitive, emotional, and social changes that significantly increase nutritional requirements. Despite its importance, adolescent nutrition remains relatively neglected in public health policies and interventions globally [1]. Increasing consumption of energy-dense and ultra-processed foods, coupled with inadequate intake of essential nutrients, has contributed to poor diet quality, micronutrient deficiencies, overweight, obesity, and cardiometabolic disorders among adolescents [2]. In addition, environmental, social, and economic factors continue to influence unhealthy dietary behaviours during this life stage [3]. Therefore, this review aimed to examine the nutritional and health characteristics of adolescents, identify the major determinants and consequences of poor nutrition, and explore opportunities for effective intervention strategies to improve adolescent health outcomes.

**MATERIALS AND METHODS:** This study adopted a narrative review approach based on published literature relating to adolescent nutrition & health. Relevant peer-reviewed journal articles, public health reports, policy documents, & global nutrition publications were reviewed to identify evidence on dietary patterns, nutritional vulnerabilities, determinants of food choice, obesity trends, micronutrient deficiencies, & intervention opportunities among adolescents. Information from international and regional studies was critically synthesized to provide a comprehensive overview of adolescent nutrition challenges & possible public health solutions.

**RESULTS AND DISCUSSION:** The review revealed that adolescents are highly vulnerable to poor nutritional outcomes due to increased nutrient requirements and unhealthy dietary behaviours. Common dietary patterns among adolescents include low consumption of fruits, vegetables, whole grains, dairy products, and micronutrient-rich foods, alongside excessive intake of sugar-sweetened beverages, snacks, processed foods, and saturated fats [2]. Micronutrients frequently identified as deficient include iron, calcium, vitamin D, iodine, folate, and zinc. These nutritional inadequacies contribute to impaired growth, poor bone health, reduced cognitive performance, anaemia, and increased susceptibility to chronic diseases [4]. The findings further showed a growing prevalence of overweight and obesity among adolescents globally, largely driven by sedentary lifestyles, excessive energy intake, and obesogenic food environments. Social

determinants such as peer influence, family income, parental education, school food environments, and food marketing significantly affect adolescents' dietary choices and lifestyle behaviours. Additionally, digital media exposure and easy access to unhealthy foods continue to worsen poor dietary practices among this age group [5]. Evidence from the reviewed studies suggests that school-based nutrition education, supportive family environments, food reformulation, improved food policies, and regulation of unhealthy food marketing can positively influence adolescent dietary behaviours. Furthermore, involving adolescents in nutrition-related interventions and policy development may enhance the effectiveness and sustainability of public health strategies targeted at this population group.

**CONCLUSION & RECOMMENDATIONS:** The review concludes that adolescent nutrition is a major public health concern with significant implications for growth, development, and long-term health outcomes. Poor dietary practices, micronutrient deficiencies, and increasing rates of overweight and obesity remain persistent challenges among adolescents globally. Environmental, social, and behavioural determinants play substantial roles in shaping adolescent dietary habits and health outcomes. Based on these findings, there is a need for comprehensive and multisectoral interventions involving schools, families, governments, communities, and the food industry to improve adolescent nutrition. Nutrition education programmes, supportive food environments, food policy reforms, and regulation of unhealthy food marketing should be strengthened to promote healthier dietary behaviours among adolescents. In addition, adolescents should be actively involved in the design and implementation of nutrition interventions and public health policies targeted at their age group.

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**Theme/sub-theme:** Adolescents Nutrition and Health: Characteristics, Risks factors and opportunities

**Title**: Assessment of Adolescents' Nutrition Knowledge and Perception of old age in Ogun State, Nigeria

**Author (s)**: *Adewale I.O. [1]Enidunni S.A. [1], Akinsanya O.B.[1], and Asha O.E[1].

**Author (s) Affiliation**: [1]Department of Food Science and Technology, Nutrition and Dietetics Unit, Bells University of Technology, Ota

***Corresponding author's e-mail address:***[adio.ifeyemi@yahoo.com](mailto:adio.ifeyemi@yahoo.com), +2348064218541

**Keywords:**Adolescents, Elderly Nutrition, Perception, Old age

Highlights

- Adolescent had average knowledge of elderly nutrition
- Adolescent perceived old age negatively
- Significant relationship exists between nutrition knowledge and perception of old age among adolescents

**Background and objective**: Ageing is an inevitable biological process, and preparing for a healthy, active, and fulfilling old age begins early in life. Adolescents' understanding of ageing significantly influences their later years. This study assessed adolescents' nutrition knowledge and perception, toward old age in Odeda and Abeokuta North Local Government Areas, Ogun State, Nigeria.

**Methodology:** A semi-structured questionnaire was administered to 500 randomly selected adolescents (aged 14–19 years) from 20 schools. To assess knowledge of elderly nutrition, Nutrition Knowledge Questionnaire originally developed by Parmenter and Wardle [1] was used. The study also evaluated perceptions of old age through an adapted version of the Children's Views of Ageing (CVOA) instrument developed by Newman [2]. Data were analyzed using descriptive statistics (frequencies, percentages) and chi-square tests ($\chi^2$).

**Results**: Table 1 presents the overall knowledge assessment scores regarding elderly nutrition. The result indicates that 53.6% of respondents demonstrated moderate understanding, while knowledge levels were poor among 27.4% of participants. Only 19.0% of adolescents exhibited comprehensive knowledge of nutritional requirements for elderly individuals. This observation is similar to the findings of Rust and See that surveyed elementary schools and found majority of them provided insufficient education about the ageing [3].

Table 2 revealed a significant association between respondents' knowledge of elderly nutrition and their perceptions of old age ($\chi^2$ test, $p < 0.05$). Notably, negative perceptions of old age were most prevalent among respondents with only average nutritional knowledge about elderly. In this study, perception of adolescents toward old age revealed over 60.0% of adolescents exhibited negative perception by describing old age and older people with various negative psychological, physical and social qualities. This research is consistent with the research conducted by Sauer [4]; who interviewed younger people about ageing.

In addition to the findings outlined above, a significant relationship was found between respondents' knowledge of elderly nutrition and perception of old age. This result could be attributed to the fact that knowledge of elderly nutrition can influence perceptions of old.

**Table 1: Overall Knowledge of Elderly Nutrition among Adolescents'**

| Knowledge of | Score F (%) | Mean ±SD |
|---|---|---|
| Poor | 137(27.4) | |
| Average | 268 (53.6) | 16.01 ± 5.261 |
| Good | 95 (19.0) | |
| Total | 500 (100.0) | |

**Table 2: Relationship between Adolescents' Knowledge of Elderly Nutrition and Perception of Old Age**

| Perception of Old Age | Knowledge of Elderly Nutrition Poor F (%) | Average F (%) | Good F(%) | $\chi^2$ | P-value |
|---|---|---|---|---|---|
| Negative | 117 (23.4) | 191 (38.2) | 0(0.0) | | |
| Neither negative nor positive | 48 (9.6) | 90 (18.0) | 1(0.2) | 15.810 | 0.015 |
| Positive | 12(2.4) | 37 (7.4) | 2(0.4) | | |

*Statistically significant ($p < 0.05$)

**Conclusion**:

The study revealed that majority of the adolescents had an average knowledge regarding elderly nutrition and had negative perceptions of old age. This therefore point to the need for more research to investigate the contributing factors to these negative perceptions.

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**Theme/sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title:** Food Accessibility and Prevalence of Highly Processed Food Intake Among In-school Adolescents in Sabon Gari LGA, Kaduna State

**Name of Author(s):** *Waziri, A. A.[1], Isah, Y. J.[2], Halilu, A. A.[3], Abubakar, H.[4], Garba, A.[3], & Salman, A. A.[3]

**Affiliation of Author(s):** [1]Federal University of Agriculture Mubi, P.M.B. 2025 Mubi, Adamawa State; [2]Institute of Nutrition, Mahidol University, Thailand; [3]Ahmadu Bello University, Zaria, Kaduna State; [4]Federal University Dutse, Dutse, Jigawa State.

*Corresponding author, e-mail: aliyuwaziri995@gmail.com, +2348134359058

**Keywords:** Highly processed foods, food access, food insecurity, adolescents.

**Highlights**

• HPF intake was high among in-school adolescents (77.5%).

• Males and adolescents aged 10-13 years had higher HPF intake.

• Food access was not significantly associated with HPF intake.

**Background and Objectives**

Consumption of highly processed foods/ultra-processed foods (HPFs/UPFs) is linked to the triple burden of malnutrition and may be shaped by food accessibility among adolescents in low- and middle-income countries (LMICs) [1,2]. Marketing, availability, affordability, and rising costs of healthier foods also drive HPF/UPF consumption [3,4]. Evidence on household food insecurity and HPF intake among adolescents in LMICs remains limited. This study evaluated the relationship between food access and HPF intake among in-school adolescents in Sabon Gari LGA, Kaduna State.

**Materials and Methods**

A school-based cross-sectional survey was conducted among adolescent boys and girls from six public and private secondary schools in Sabon Gari, selected by stratified sampling. A structured survey collected sociodemographic, food security/access, and food consumption data. Household food accessibility was assessed using the Household Food Insecurity Access Scale (HFIAS), while food consumption patterns were assessed using a food frequency questionnaire. The highly processed food index (HPFI) was defined as intake of at least one of three HPF categories: sugar-

sweetened beverages (SSBs), sweets, or savory/fried snacks. Descriptive and inferential analyses were conducted at $p < 0.05$.

**Results and Discussion**

The high HPF prevalence aligns with reports of rising UPF intake and changing food environments [2-4]. The non-significant food-access relationship is consistent with evidence that food insecurity may not independently differentiate UPF intake where intake is high across adolescent groups [1].

**Table 1: Summary of key results on food access and HPF intake**

| Indicator | Key finding |
|---|---|
| HPF prevalence | Overall: 77.5%; males: 83.9%; age 10-13 years: 91.7% |
| Low food access | Males: 94.7%; public-school students: 78.9% |
| HPF groups consumed | Savory/fried snacks: 54.1%; sweets: 45.0%; SSBs: 26.1% |
| Food access relationship | Low food access: savory/fried snacks 78.9%; no significant association with snacks, sweets, or beverages ($p > 0.05$); weak negative HFIAS-HPFI correlation. |

**Conclusion**

HPF intake was high among in-school adolescents, but food access was not significantly associated with intake.

**Recommendation**

School-based nutrition education and improved access to affordable, healthy foods are recommended.

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# THE REALITY OF ADOLESCENT FOOD ENVIRONMENTS AROUND THE WORLD: IN OUR OWN WORDS

**Theme/Sub-theme:** Adolescent Nutrition and Food Environments in Low- and Middle-Income Countries
**Author(s):** Jayeola T., Rabbi M., Elizabeth A.D., Cameseria M.J., Echtay R., Mukwekwezeke T.
**Affiliation(s):** ENN Youth Partners — Nigeria, Bangladesh, Uganda, Philippines, Lebanon, Zimbabwe
**Keywords:** *Adolescent food environments; school nutrition; low- and middle-income countries; food choices*

## BACKGROUND AND OBJECTIVES

The period of adolescence (10–19 years) is a critical window of growth and development that has important long-term health and wellbeing consequences (Lassi, Moin & Bhutta, 2017). Globalisation, urbanisation, unregulated marketing and technological advances have created an environment for food that favours high fat, sugar, and salt food products globally (Hastings et al., 2006; UNICEF, 2025). For the first time, global rates of obesity among school-aged children and adolescents now surpass underweight (UNICEF, 2025). These unhealthy food environments limit access to micronutrients and protein needed for adolescent growth and development (Lassi et al., 2017). This study reports the food environments of six low and middle-income countries (LMICs) as experienced by ENN Youth Partners, and the challenges that shape adolescents' food choices. It aims to gain insight into factors influencing adolescent food selection, to recognize shared obstacles to healthier foods, and to produce evidence from the perspective of youth to guide policy and intervention for the creation of a healthier food environment (Greiner, 2023; Lelijveld, Samnani & James, 2025).

## MATERIALS AND METHOD

This article employs a descriptive qualitative, lived-experience approach in the six low- and middle-income countries (LMICs) where ENN Youth Partners come from: Bangladesh, Lebanon, Nigeria, Uganda, Zimbabwe and the Philippines. ENN partners from the adolescent/youth years shared their experiences of the food environment in their local area. This article was created based on initial questions that were presented to public health nutrition experts and later expanded to ENN Youth Partners (Greiner, 2023). Participants' narrative responses to questions about their food environments, influences on adolescent food selections, and suggestions for policy interventions to support adolescent nutrition were used to collect data.

The qualitative narratives were analyzed based on certain similarities and differences within the countries to highlight common challenges and solutions.

## RESULTS AND DISCUSSION

The results highlight commonalities among the six LMICs in terms of the challenges encountered when accessing nutritious foods, availability of ultra-processed foods, food affordability, aggressive food marketing, and the poor implementation of school food policies faced by adolescents. These results concur with past evidence showing that the food environment and food marketing have a significant impact on adolescents' food choices (Hastings et al., 2006; UNICEF, 2025). Advice for the strengthening of nutrition policies and programmes for children of primary and secondary school age was also recently provided (Lelijveld et al., 2025), which is also reflected in the policy recommendations proposed by the youth partners.

**Table 1: Country-level risk factors influencing adolescent food environments**

| Country | Primary Risk Factor | School Food Environment | Policy Gap |
|---|---|---|---|
| Bangladesh | Peer pressure; junk food marketing | Canteens dominated by ultra-processed snacks | Nutrition education absent from curricula |
| Nigeria | Affordability; meal skipping | Reliance on food from home; external vendors | No compulsory secondary school feeding |
| Lebanon | Economic crisis; displacement of traditional diet | Unhealthy canteen foods; no public school meals | Limited state investment in school nutrition |
| Uganda | Boarding school model; limited variety | Structured but nutritionally limited meals | Affordability limits replication at scale |
| Zimbabwe | Tuck shops; social media advertising | School-operated snack shops; unhealthy food | Food safety labelling laws unenforced |
| Philippines | Affordability; limited parental nutritional knowledge | Starchy, processed foods predominant | DepEd Order No. 13 poorly enforced |

**Table 2: Priority policy recommendations from adolescent youth partners**

| Recommendation | Target Level | Expected Outcome |
|---|---|---|
| Universal nutritious school meals | Primary and secondary schools | Reduced hunger; improved academic performance |
| Mandatory nutrition education in curricula | All school levels | Informed food choices; lifelong healthy habits |
| Regulate junk food marketing to children | National government | Reduced exposure; lower intake of regulated products |

## CONCLUSION AND RECOMMENDATIONS

Adolescents' food environments are becoming more dominated by low-cost, convenient, and unhealthy foods. Increased government regulation, increased size of healthy school meal programmes, increased nutrition education, and enforcement of the restrictions on unhealthy food

marketing are key to enhance adolescent nutrition, as per current global recommendations (UNICEF, 2025; Lelijveld et al., 2025).

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**THEME**: Delivering Better Nutrition for All: Connecting the Dots across Life Cycle, Systems & Sectors

**SUB-THEME:** Adolescent Nutrition and Health: Characteristics, Risk Factors and Opportunities of an Overlooked Life stage

**TITLE:** Household characteristics, Nutritional knowledge and Food Choices of In-School Adolescents in Ondo West Local Government Area, Ondo, Nigeria.

**NAME OF AUTHOR**: Oluwadamilare, P.A & Olaitan, O.O

**AFFILIATION**: Department of Human Nutrition and Dietetics, Ondo State University of Medical Sciences, Ondo, Ondo State, Nigeria.

**EMAIL AND PHONE NUMBER:** preciousanjolaoluwa08@gmail.com, +2348065145108

**KEYWORDS:** In-school Adolescents, Nutrition Knowledge, Food choice

## HIGHLIGHTS OF STUDY

Factors contributing to adolescents' food choice beyond school food environment are identified. The information provided is useful in developing policy to guide adolescents' nutrition programme.

## BACKGROUND AND OBJECTIVE

Adolescence is a critical developmental stage marked by rapid physical growth, cognitive maturation, and evolving social identity (1). During this period, nutritional needs increase significantly, and dietary habits formed often persist into adulthood. Nutritional knowledge has been found to be positively associated with healthier eating patterns, though the relationship might not always be linear (2). However, beyond the school food environment, there is much to know about significant roles of household characteristics such as household type, family size, socioeconomic status and methods of parenting in adolescents' nutrition knowledge and dietary choice (3). This study examined association between household characteristics, nutrition knowledge and food choices among in-school adolescents.

## MATERIALS AND METHODOLOGY

A cross sectional study was conducted among 289 in-school adolescents aged 10-19 years from five randomly selected Secondary Schools in Ondo West Local Government Area. A pretested self-administered questionnaire was developed to obtain information on demographic and household characteristics, nutrition knowledge, and food choices. Nutrition knowledge was classified into: poor ($\leq 3$ points) or good ($\geq 4$ points). Statistical Package for Social Sciences 29.0 was used for data analysis. Data were summarised using frequency and percentage while chi-square was performed at 5% level of significance ($p<0.05$) to determine association.

## RESULTS AND DISCUSSION

Respondents were 61.0% females and 39.0% males. More than half (57.1%) were within 14-16 years of age, 40.0% were in Junior secondary class (JSC) 2, 10.3% in JSC 3, 10.0% in Senior Secondary class (SSC) 1, and 39.7% in SSC 2. Those who resided in urban, semi-urban and rural areas were 79.6%, 15.9% and 13.4%, respectively. Respondents from monogamous and polygamous families were 78.0% and 22.0%, respectively. While, 71.6% belonged to households which had access to nutritious foods, 47.7% had parents with tertiary education, 85.4% had married parents, and 75.0% had parents who were both employed. Those who had nutrition knowledge were (75.5%). Parents (36.2%), schools (34.3%), media (15.1%) and health

professionals (13.6%) were major sources of nutrition information. Determinants of food choice at home and school were parents (62.9%) and self (47.6%), respectively. Meal skipping (24.1%), worry about meals (27.5%), daily intake of snacks (80.7%), soft drink (41.1%), dairy (37.3%) and fried foods (32.2%) characterized respondents' dietary lifestyle. Their nutrition knowledge was associated with residential location ($\chi^2$ = 2.01, p=0.037), gender ($\chi^2$ = 3.75, p=0.05), education level ($\chi^2$ =20.99, p=<0.001) and intake of dairy foods ($\chi^2$ = 12.58, p=0.03). Adolescents from higher-income households and those who belong to household who have access to continuous food supply through sources such as home garden were more likely to consume balanced meals, including fruits, vegetables, and protein-rich foods, while those from lower-income households, with limited access to sustainable foods often relied on starchy staples and processed snacks due to affordability constraints (4).

## CONCLUSION AND RECOMMENDATION

Adolescents' nutrition knowledge and food choice are shaped by household, socio-demographic characteristics, access to nutrition information and school nutrition-related activities. Following this observation, it is recommended that promoting nutrition literacy among school teachers and parents, integrating nutrition education into school curriculum and improving access to healthy foods in schools will enhance healthy food choice among in-school adolescents.

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**Sub Theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage.**

**Title: Factors influencing Food Choices, Nutritional Status and Depressive Disorder among Adolescents Attending Government Secondary Schools in Abeokuta Metropolis, Ogun State.**

***Olatunji T.J. [1], Ilori O.A[1], Oyesanya B. A. [2], Onaolapo T.T. [1], and Lam F.J. [1]**

*[1]Department of Nutrition and Dietetics, Moshood Abiola Polytechnic Abeokuta, Ogun State.*

*[2]Department of Nutrition and Dietetics, Federal University of Agriculture Abeokuta, Ogun State.*

****Corresponding author;*** *janetolatunji19@gmail.com*

**KEYWORDS: Food choice, Depressive disorders, Adolescents, Nutritional status**

**HIGHLIGHT:**

- Dietary pattern revealed high refined sugar intake and low proteins, vitamins and mineral rich foods intake.
- 66.8% of the respondents are within the normal BMI range
- Only 25% of the respondents have no/minimal depression
- Food choices greatly influence depressive disorders among the respondents and vice versa

**BACKGROUND AND OBJECTIVES:** Adolescence is a critical important stage of life for mental health and well-being of an individual [1], not only for the reason that this is when young people acquire autonomy, social interaction, self-control and rapid learning[2], but also because of the ability and potentials formed during this period have a direct bearing on their mental health for the rest of their lives[3]. This study aimed to assess the factors influencing food choices, nutritional status and depressive disorder among adolescents in Abeokuta Metropolis.

**METHODOLOGY**: A descriptive cross-sectional design was employed involving 440 apparently healthy adolescents selected through a multistage sampling technique across 10 Government Secondary Schools within Abeokuta. Data were collected using a validated structured questionnaire capturing socio-demographic characteristics, Dietary pattern, Anthropometric measurements using the Body Mass Index (BMI), Factors influencing Food choices using the Food Choice Questionnaire (FCQ) and Depressive Disorder using the Patient Health Questionnaire-9 (PHQ-9) rated from minimal/no depression to severe depression and inferential statistics at $p < 0.05$ significance level.

**RESULT AND DISCUSSION:** 62.7% of the respondents were within ages 15-19 and 56.8% being female; there is a high educational attainment of tertiary education among both parents (father; 34.8%, mother; 33.6%). Dietary pattern result revealed that grains especially Rice (33.4%) and Pastries/Confectionaries (26.4%) were the most commonly daily consumed food groups, legumes were consumed by 29.7% of the respondents 3-4 times per week and 17.7% of them consumed processed foods 3-4 times per week. Factors influencing their food choices showed 43.9% ate due to food Availability, 50.2% of the respondent's Parents decide what they eat while 21.8% of the respondents' food choice was influenced by Health. The relationship between dietary pattern and depressive disorder revealed a significant relationship between roots and tubers and fruits with p-value of 0.003 and 0.019 respectively.

**Table 1: Level of Depression among the Respondents (n= 440)**

| Level of Depression | Percentage (%) |
|---|---|
| Minimal or No depression | 25 |
| Mild depression | 36.36 |
| Moderate depression | 23.63 |
| Moderately severe | 11.82 |
| Severe depression | 2.72 |

**Table 2: Relationship between factors influencing Food choices and Depressive disorder (n= 440)**

| Variables | Frequency | Percentage | p-Value |
|---|---|---|---|
| **Do you feel your mood affects your eating habit** | | | |
| Yes | 321 | 73.0 | 0.003 |
| No | 119 | 27.0 | |
| Total | 440 | 100 | |
| **Do you eat more unhealthy food when stressed/sad** | | | |
| Yes | 167 | 38.0 | 0.004 |
| No | 273 | 62.0 | |
| Total | 440 | 100 | |
| **Do you feel healthier food choices make you feel better mentally** | | | |
| Yes | 331 | 75.2 | 0.665 |
| No | 169 | 24.8 | |
| Total | 440 | 100 | |
| **In your opinion does poor diet worsen how you feel emotionally** | | | |
| Yes | 278 | 63.2 | 0.026 |
| No | 162 | 36.8 | |
| Total | 440 | 100 | |

**Table 3: Anthropometric Status of the Respondents (n= 440)**

| Body Mass Index | Frequency | Percentage |
|---|---|---|
| Underweight (<18.5kg/$m^2$) | 124 | 28.2 |
| Normal (18.5-24.9kg/$m^2$) | 294 | 66.8 |
| Overweight (25-29.9kg/$m^2$) | 21 | 4.8 |
| Obese 1 (30-34.9kg/$m^2$) | 1 | 0.2 |

**CONCLUSION:** The study concludes there is significance between dietary pattern, Anthropometric status and mental health of the respondents as there was a positive effect on the respondents' nutritional status and their mental health with result showing that the majority of the respondents have mild depression.

**RECOMMENDATION**: Health policy makers should introduce mental health screening and nutritional assessment into school health programs. Nutritionist, Psychologist, and counselors can help identify at-risk Adolescents early and provide interventions.

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**Theme/Sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

# Title: Unhealthy Dietary Patterns and Knowledge of Dietary Risk Factors for Type 2 Diabetes Mellitus Among Adolescents and Young Adults in Southwest Nigeria

**Name of Author(s):** *Tubi-Nwangwu, I.[1], Ajibulu, A.[2]

**Affiliations**

[1]Department of Human Nutrition and Dietetics, Lead City University, Ibadan, Nigeria.
[1]Department of Public Health, Lead City University, Ibadan, Nigeria.
[2]Department of Human Nutrition and Dietetics, Bowen University, Iwo, Osun state, Nigeria.

*Corresponding Author: tubi.mary@lcu.edu.ng, +2348110777872

Keywords: Adolescents; Dietary patterns; Nutrition knowledge; Type 2 diabetes mellitus

## Highlights

- Poor knowledge of T2DM dietary risk factors predicted unhealthy dietary patterns.
- Nearly three-quarters of adolescents exhibited unhealthy dietary patterns.
- High sugar-sweetened beverage intake and low fruit intake were common.

## Background

Adolescence is a critical period for establishing dietary behaviours that influence future metabolic health. Poor dietary practices increase the risk of type 2 diabetes mellitus (T2DM), yet evidence linking nutrition knowledge with dietary behaviour among Nigerian adolescents remains limited [1,2]. This study assessed knowledge of dietary risk factors for T2DM, dietary patterns, and factors associated with healthy dietary practices among adolescents and young adults in Southwest Nigeria.

## Materials and Methods

A cross-sectional study was conducted among 407 adolescents and young adults selected from four universities in Southwest Nigeria using a multistage sampling technique. Data were collected using a pretested questionnaire and food frequency questionnaire. Descriptive statistics, Chi-

square tests and binary logistic regression were used for data analysis. Statistical significance was set at $p < 0.05$.

**Results and Discussion**

The mean age of respondents was 17.28 ± 1.34 years, and 61.2% were female. More than half (56.5%) had poor knowledge of dietary risk factors for T2DM. Only 13.1% reported frequent fruit and vegetable consumption, whereas 80.1% frequently consumed sugar-sweetened beverages. Overall, 74.2% exhibited unhealthy dietary patterns (Table 1).

Knowledge of dietary risk factors was significantly associated with dietary pattern ($\chi^2 = 10.68$, $p = 0.0015$). After adjustment for confounding variables, respondents with good knowledge were almost twice as likely to exhibit healthy dietary patterns (AOR = 1.85; 95% CI: 1.18–3.03). Female sex, age 18–19 years and higher monthly allowance were also independent predictors of healthy dietary patterns.

These findings support previous studies showing that nutrition knowledge promotes healthier dietary choices among adolescents [1,2]. However, the persistently high consumption of sugar-sweetened beverages and low fruit and vegetable intake indicate that knowledge alone is insufficient to improve dietary behaviour. Food availability, affordability and the broader food environment are likely to influence adolescents' dietary choices [3]. Frequent consumption of sugar-sweetened beverages has also been associated with increased risks of overweight, obesity and future T2DM among children and adolescents [4].

**Table 1. Key Findings and Predictors of Healthy Dietary Pattern (N = 407)**

| Indicator | Finding |
|---|---|
| Mean age | 17.28 ± 1.34 years |
| Female respondents | 61.2% |
| Poor knowledge of T2DM dietary risk factors | 56.5% |
| Frequent fruit/vegetable consumption | 13.1% |
| Frequent sugar-sweetened beverage consumption | 80.1% |
| Unhealthy dietary pattern | 74.2% |
| Knowledge associated with dietary pattern | $\chi^2 = 10.68$, $p = 0.0015$ |
| Good knowledge | AOR = 1.85 (95% CI: 1.18–3.03); p = 0.008 |
| Female sex | AOR = 2.11 (95% CI: 1.35–3.30); p = 0.001 |

| Indicator | Finding |
|---|---|
| Age 18–19 years | AOR = 1.32 (95% CI: 1.04–1.67); p = 0.021 |
| Higher monthly allowance | AOR = 1.91 (95% CI: 1.13–3.23); p = 0.015 |

**Conclusion**

Poor knowledge of dietary risk factors for T2DM and unhealthy dietary patterns were common among adolescents and young adults in Southwest Nigeria. Better nutrition knowledge significantly increased the likelihood of healthy dietary practices; however, unhealthy dietary behaviours remained prevalent. Strengthening nutrition education alongside healthier university food environments may help reduce future T2DM risk.

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**SUB-THEME: ADOLESCENT NUTRITION AND HEALTH**

# Prevalence and Determinants of Acute and Chronic Malnutrition among Children Aged 6-59 Months in Calabar South Local Government Area, Cross River State, Nigeria

*Idonije-Ushie, C.O.[1], Aburime, L.[2]

[1]Department of Public Health, University of Calabar, Calabar, Nigeria
[2]Department of Human Nutrition and Dietetics, University of Calabar, Calabar, Nigeria

***Corresponding Author Email**: faithcomfort15@gmail.com / +234 816 569 2790
**Keywords**: Childhood malnutrition, stunting, wasting, underweight

**Highlights**

- Stunting affected 27% of children aged 6-59 months in Calabar South.
- Maternal nutrition knowledge and feeding practices predicted malnutrition.
- Household size, birth rank and untreated water increased wasting risk.

## BACKGROUND AND OBJECTIVES:

Childhood malnutrition remains a major public health problem in low- and middle-income countries, contributing to morbidity, mortality and poor cognitive development **[1]**. Limited local evidence on its burden and determinants hinders targeted interventions in Nigeria. This study assessed the prevalence of acute and chronic malnutrition and associated socio-demographic and maternal factors among children aged 6-59 months in Calabar South Local Government Area, Cross River State.

## MATERIALS AND METHOD:

A community-based cross-sectional study involving 385 children aged 6-59 months was conducted using multistage and simple random sampling in three wards of Calabar South LGA. Socio-demographic, maternal and child feeding data were collected using structured questionnaires, while anthropometric measurements were used to assess nutritional status based on the WHO Child Growth Standards **[2]**. Data were analyzed with descriptive and inferential statistics using IBM SPSS Statistics version 25, $P<0.05$ was considered statistically significant.

## RESULTS AND DISCUSSION:

The prevalence of malnutrition presented in **Table 1** indicates a substantial burden of both chronic and acute undernutrition among children aged 6–59 months in the study area.

**Table 1:** Prevalence of malnutrition among children aged 6-59 months (n = 385)

| Nutritional indicator | Prevalence (%) |
|---|---|
| Stunting | 27.0 |
| Wasting | 19.0 |
| Underweight | 18.4 |

Inferential analysis showed significant associations between household and maternal factors and child feeding and nutritional outcomes. Children from larger households were less likely to meet the recommended feeding frequency ($p < 0.05$), while children of more highly educated mothers were more likely to receive meals at the recommended frequency ($\chi^2 = 22.566$, df = 4, $p < 0.001$). Caregivers with better knowledge of complementary feeding had fewer children affected by acute malnutrition than those with poorer knowledge ($\chi^2 = 17.063$, df = 4, $p = 0.002$). These findings highlight the roles of household size, maternal education and complementary feeding knowledge in child feeding and nutritional status.

## CONCLUSION AND RECOMMENDATION:

Childhood malnutrition remains a significant public health problem in the study area, with over one-quarter of children experiencing chronic undernutrition. Household size, maternal educational attainment and caregivers' knowledge of complementary feeding significantly influenced child feeding practices and nutritional status. Community-based nutrition education, promotion of appropriate complementary feeding, improved maternal literacy and interventions that address household food security are essential for reducing the burden of child malnutrition in the study area.

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**THEME/SUB-THEME:** Adolescent Nutrition and Health: Characteristics, Risk Factors and Opportunities of an Overlooked Life Stage.

**TITLE:** Assessing Knowledge of Ultra-processed Foods and Anthropometric Status of Adolescents Aged 10-19 Years in Ibadan Southwest Local Government, Ibadan, Oyo State.

**NAME OF AUTHOR(S)**: *Abiola M.F., Adegbayi A.O., Olaniran O.P., and Oduola T.S

**AFFILIATION OF AUTHOR(S):** [1] Department of Human Nutrition and Dietetics, Lead City University, Ibadan. *mayowafortune@gmail.com, 09070777090

**KEYWORDS:** Ultra-processed foods, Adolescents, Anthropometric Status, Body Mass Index

**HIGHLIGHTS:**

- 45.2% had poor knowledge of ultra-processed foods.
- 63.6% had moderate UPF consumption; females had higher obesity risk.
- No significant link between knowledge, UPF intake, and anthropometry.

## BACKGROUND AND OBJECTIVES

Childhood and adolescent overweight, obesity, and diet-related non-communicable diseases have increased globally, largely due to the growing consumption of processed and ultra-processed foods [1]. Nigeria is experiencing this nutrition transition, with dietary patterns shifting from traditional foods to more ultra-processed products [2]. Therefore, this study investigated the association between ultra-processed food consumption and the anthropometric status of adolescents aged 10–19 years in Ibadan South-West Local Government Area, Oyo State, Nigeria.

## MATERIALS AND METHOD

This study employed an analytical cross-sectional design to assess adolescents' knowledge of ultra-processed foods and their anthropometric status among 250 secondary school students aged 10–19 years in Ibadan South-West Local Government Area, Oyo State. A multistage sampling technique was used to select the participants. Data were collected using structured questionnaires and standard anthropometric measurements. The validity and reliability of the research instruments were established through expert review, pre-testing, and appropriate statistical procedures. Data were analysed using descriptive and inferential statistics with IBM SPSS Statistics version 27.0, with statistical significance set at $p < 0.05$. Ethical approval was obtained, while informed consent and assent were secured from the appropriate participants, and confidentiality was maintained throughout the study.

## RESULTS AND DISCUSSION:

The findings showed that 45.2% of adolescents had poor knowledge of ultra-processed foods (UPFs), while 63.6% reported moderate UPF consumption. Although a 40.8% of participants, particularly females (49.6%), were at high risk of central obesity, there was no statistically significant association between knowledge level, UPF consumption, and anthropometric status (BMI and WHR) ($p > 0.05$).

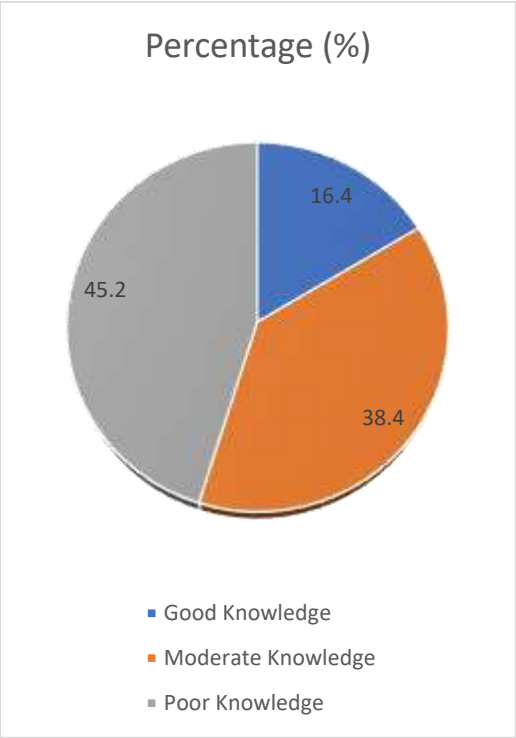



**Figure 1: Level of Knowledge of UPF**

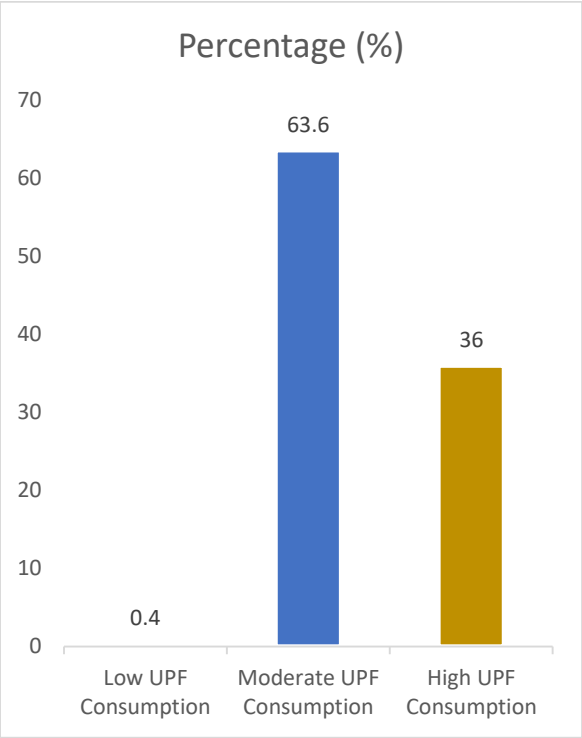



**Figure 2: Level of UPF Consumption**

There was no significant relationship between knowledge score and UPF consumption ($r = -0.063$, $p = 0.319$), BMI and UPF consumption ($r = -0.022$, $p = 0.728$), or WHR and UPF consumption ($r = -0.040$, $p = 0.533$) among the respondents. Despite poor knowledge and moderate ultra-processed food consumption, no significant association was found with anthropometric status, suggesting that other factors may influence adolescents' dietary behaviours and nutritional outcomes.

## CONCLUSION AND RECOMMENDATIONS

Most adolescents had poor knowledge of ultra-processed foods and reported moderate levels of ultra-processed food consumption, while a considerable proportion, particularly females, were at high risk of central obesity. No statistically significant association was found between knowledge of ultra-processed foods, consumption levels, and anthropometric status. Therefore, nutrition education and healthy eating interventions should be strengthened among adolescents, and further longitudinal studies are recommended to explore other factors influencing dietary habits and nutritional status.

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**Sub-theme:** Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

# Association between Dietary Patterns and Mental Health among Nigerian University Students

***Ani, P. N, Ibeanu, V. N., Eze, S. N. & Ogenyi, P. O.**

Department of Nutrition and Dietetics, University of Nigeria, Nsukka Enugu State, Nigeria

***Corresponding author, email:** peace.ani@unn.edu.ng, +2348032501119

**Keywords**: dietary patterns, mental health, undergraduates, adolescents

**HIGHLIGHTS**

- Fruit intake was positively associated with improved mental health.
- Fast-food consumption showed an inverse association with mental health.
- Self-prepared meals were linked with improved psychological well-being.

**BACKGROUND AND OBJECTIVES:** Mental health disorders are increasingly recognized among university students. and contribute substantially to poor academic performance, reduced quality of life, and long-term health consequences. Studies have shown that a substantial proportion of undergraduate students experience symptoms of depression, anxiety, and suicidal ideation, highlighting mental health as an important public health concern among young adults [1]. Dietary patterns and overall diet quality are important modifiable factors that influence mental health through their effects on brain function, inflammation, and neurotransmitter synthesis. However, data examining this relationship among Nigerian undergraduates remain limited. This study investigated the association between dietary patterns and mental health among undergraduate students in Nigeria.

**MATERIALS AND METHOD:** A cross-sectional survey design was conducted to randomly select 400 undergraduate students using a multi-stage sampling technique. The respondents were selected from two universities in Enugu State, Nigeria. Data were collected using structured validated questionnaire and anthropometric measurements. The questionnaires assessed socio-demographics, dietary patterns, food frequency, and mental health. Mental health was evaluated using the Mental Health Continuum–Short Form (MHC-SF) and the World Health Organization Well-Being Index (WHO-5). Anthropometric measurements of weight and height were obtained and used to calculate the body mass Index [BMI]. Waist-hip ratio (WHR) was also calculated from waist and hip circumference. Data were analyzed with SPSS version 21 and significance was set at $p < 0.05$.

**RESULTS AND DISCUSSION:** Positive correlations were observed between mental health and fruit and vegetable consumption, fruit consumption frequency, whole fruit snacking, plant-based milk intake, and consumption of self-prepared meals. Conversely, frequent fast-food consumption

showed a significant inverse relationship with mental health (Table 1). These findings support growing evidence that healthier dietary behaviours are associated with improved psychological well-being among young adults. Fruits and vegetables supply vitamins, minerals, antioxidants and dietary fibre that promote neurotransmitter synthesis, reduce oxidative stress, and support gut microbiota, all of which contribute to better mental health [2,3]. Likewise, self-prepared meals may encourage healthier food choices and better dietary quality. In contrast, frequent fast-food consumption, characterized by high levels of saturated fat, refined carbohydrates, and sodium, has been associated with increased inflammation and poorer mental health outcomes [4].

**Table 1: Significant correlations between dietary patterns and mental health (N = 400)**

| Dietary variable | Mental health measure | Correlation coefficient (r) | P-value |
|---|---|---|---|
| Fruit and vegetable consumption | MHC-SF | 0.106 | 0.034 |
| Frequency of fruit consumption | MHC-SF | 0.173 | 0.001 |
| Whole fruit consumed as snacks | WHO-5 | 0.118 | 0.018 |
| Plant-based milk consumption | WHO-5 | 0.103 | 0.040 |
| Self-prepared food consumption | MHC-SF | 0.120 | 0.016 |
| Frequency of fast-food consumption | MHC-SF | -0.136 | 0.006 |

*Abbreviations: MHC-SF = Mental Health Continuum–Short Form; WHO-5 = WHO Well-Being Index.*

**CONCLUSION AND RECOMMENDATIONS:** Healthier dietary practices, particularly increased fruit consumption and regular intake of self-prepared meals, were associated with better mental health among Nigerian undergraduate students, whereas frequent fast-food consumption was associated with poorer mental health. Universities should strengthen nutrition education programmes, promote healthy campus food environments, and encourage healthier eating behaviours to support students' psychological well-being.

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**SUB THEME**: Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage

**Title**: Socioeconomic Status of Parent, Dietary Pattern and Mental Health Outcomes of In-School Adolescents in Selected Local Government Areas in Ogun State

**Name of Authors**: *Sokunbi-seyi P.O.[1] Balogun O.O.[2],

**Affiliation of Authors**: [1]Department of Human Nutrition and Dietetics, Lead City University, Ibadan

[2]Department of Human Nutrition and Dietetics, Lead City University, Ibadan.

*Corresponding author, email: olaoluwaajibodun@yahoo.com, +2348129962713

**Keywords**: Socioeconomic Status, Adolescents, Dietary pattern and Mental health outcomes

**Highlights:**

- Healthy diet linked to positive self-concept
- Socioeconomic status had a significant relationship with anxiety levels of in-school adolescents.

## BACKGROUND AND OBJECTIVES

Poor dietary habits, socioeconomic instability, and rising mental health challenges among adolescents in Ogun State highlight a pressing research gap. The objectives included assessing parental Socioeconomic status (SES), identifying dietary patterns, determining the prevalence of mental health outcomes, and exploring the relationship between SES, diet, and mental health.

## MATERIALS AND METHOD

A cross-sectional design using stratified multistage sampling method was used in selecting 404 adolescents from private and public secondary schools across Obafemi Owode, Ifo, and Abeokuta North LGAs. SES was assessed using a standardized SES index. Dietary patterns was measured using Food Frequency Questionnaires (FFQ). Mental health outcomes; anxiety, anger and self-concept was evaluated using validated inventories (Back Anxiety Inventory, Clinical Anger Scale and Robson-Self-Concept-Questionnaire respectively). Data analysis involved descriptive

statistics and inferential tests to examine associations between SES, diet, and mental health outcomes.

## RESULTS AND DISCUSSION

Respondents with high SES and healthy diets reported positive mental outcomes, including low anxiety (35.8%, p = 0.434) and minimal anger (36.8%, p = 0.150), These findings highlight the positive influence of nutrition and SES on adolescent mental health [1], the non-significant p-values indicate observed trends rather than statistically reliable associations aligning with global evidence that healthy dietary patterns (e.g., Mediterranean-style) reduce risks of depression and anxiety [2].

**Association Between Socioeconomic Status and Anxiety Levels among In-school adolescents**

| Anxiety Level | SES Category | Dietary Pattern | | Total n (%) | p-value |
|---|---|---|---|---|---|
| | | Unhealthy n (%) | Healthy n (%) | | |
| Low Anxiety | Low SES | 2 (0.8) | 4 (1.7) | 6 (2.5) | |
| | Middle SES | 32 (13.3) | 55 (22.9) | 87 (36.3) | |
| | High SES | 61 (25.4) | 86 (35.8) | 147 (61.3) | 0.434 |

*Statistically significant (p<0.05)
**Statistically significant (p<0.01)

## CONCLUSION AND RECOMMENDATIONS

This study shows that SES and dietary patterns jointly shape adolescent mental health outcomes. Policymakers should integrate nutrition education and mental health programs in secondary schools.

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**Theme/sub-theme: Adolescent Nutrition and Health: Characteristics, Risk Factors and Opportunities of an Overlooked Life Stage**

**Title: Association between Nutritional Knowledge and Body Mass Index of Out-of-school Adolescents (10-19 years) in Makurdi, Benue State**

**Name of Author (s): Gwadza P. M[1], Adedayo E. O.[1] and Dada I.O[1]**

**Affiliation of author:** [1]Department of Human Nutrition and Dietetics, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria

***Correspondence Author:** gwadzamp@abuad.edu.ng, +2348145028450

**Keywords:** Nutritional Knowledge, Nutritional status, Adolescents, Out-of-school

**Highlights**

- Approximately 8 in every 10 adolescents had poor nutritional knowledge and almost half of the adolescents had poor dietary diversity
- Out of school adolescents experienced a dual burden of malnutrition with over two-fifth overweight/obese
- No association was found between nutritional knowledge and nutritional status

**BACKGROUND AND OBJECTIVES**

Adolescence is a second window of opportunity for growth and development. Out-of-school adolescents are vulnerable group to malnutrition due to limited access to education, poor socio-economic conditions and increased exposure to unhealthy dietary environments [1]. In Nigeria, rapid urbanization and dietary transition have contributed to the increasing burden of malnutrition [2]. The aim of this study was to assess the association between nutritional knowledge and nutritional status among out-of-school adolescents in Makurdi, Benue State.

**METHODS**

The study was a descriptive cross-sectional study among 200 out-of-school adolescents in Makurdi, Benue State which were recruited using multi-stage sampling technique. Nutritional knowledge questionnaire and individual dietary diversity score were used to assess nutritional knowledge and dietary diversity. Nutritional status was established using body mass index calculated as weight divided by height per meter square. Data were analysed using statistical product and service solution (SPSS) software.

**RESULT/DISCUSSION**

Majorities (84.5%) of the adolescents had poor nutritional knowledge, 13% had average and only 2.5% had good nutritional knowledge. Formal educational settings often provide structured exposure to health education and school-based awareness programmes that contribute to nutritional literacy. Out-of-school adolescents are often excluded from these opportunities, thereby limiting their access to scientifically accurate nutrition information [3]. Almost half (45.5%) of the adolescents had inadequate dietary diversity while 54.5% had adequate dietary diversity. Dietary inadequacy may cause reduced concentration, productivity and increased vulnerability to malnutrition [4]. About 50% were nourished, 7.5% were underweight, 28% overweight and 14.5% obese. Overweight and obesity increases the risk of hypertension, dyslipidaemia, insulin resistance, depression and social stigma and adult cardiovascular disease. Conversely, under-nutrition can result in delayed sexual maturation, reduced muscle mass, compromised immunity, poor cognitive performance, reduced physical productivity and future reproductive complications [5]. The absence of an association between nutritional knowledge and nutritional status (p=0.828) among out-of-school adolescents may be attributed to several interrelated factors beyond knowledge acquisition alone.

## CONCLUSION

Adolescents exhibited poor nutrition knowledge, inadequate dietary diversity and a double burden of malnutrition. Community-based nutrition education is recommended to improve adolescent nutrition

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**Theme: delivering better nutrition for all: connecting the dots across life cycle, systems and sectors**

**Sub-theme: Adolescent nutrition and health: characteristics, risk factors, and opportunities of an overlooked life stage**

# Title: Effect of a Combined Nutrition Education and WASH Intervention on Nutrition Knowledge of School-going Adolescents in Nigeria: A Comparative Baseline–Endline Study

**Author (s):** [1,2]* Sopuru J.C., [1]Ukegbu P.O., [1]Anyika-Elekeh J.U., [1]Chijioke, D.S., [1]Okereke I., [3]Kanu R. U., [3]Anyanwu E., [4]Onwuka J., [1]Okwunodulu, C.C., and [5] Ukegbu A.

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria.

[2]Department of Food Science and Technology, Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria

[3]Department of Agricultural Extension, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria

[4]Department of Crop and Soil Science, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria

[5]Department of Community Medicine, Federal Medical Centre Umuahia, Abia state, Nigeria.

*Corresponding email: sopuru.joy250@gmail.com +2347062340805

**Key words: Nutrition Knowledge, School-going adolescents, intervention, Abia State**

**Highlights:**

- At baseline, Participants had equivalent nutrition knowledge between groups
- Participants who received intervention had improved nutritional knowledge at endline.

## BACKGROUND AND OBJECTIVES

Adolescence is a critical window for establishing lifelong dietary and hygiene practices, yet many school-going adolescents in low- and middle-income settings, including Nigeria, have limited nutrition knowledge and suboptimal dietary behaviour [1]. Nutrition education, an important tool, when delivered through schools is widely recommended as a strategy for improving adolescent nutrition knowledge and, ultimately, dietary practice [2], but evidence on its effectiveness in Nigerian secondary-school settings remains limited [3]. This study evaluated the effect of nutrition education intervention on the knowledge of school going adolescents, comparing an intervention group that received the education programme with a control group that did not.

## MATERIALS AND METHOD

A longitudinal baseline–endline study was conducted among school going adolescents; The intervention group received a structured nutrition and WASH education programme; the control group received only WASH intervention. Nutrition and WASH knowledge were assessed at baseline and endline using a structured questionnaire. Data were analysed using independent and paired t-tests, McNemar's test at a significance level of $p < 0.05$.

## RESULTS AND DISCUSSION

### Results

**Table 1: Baseline Nutrition Knowledge of the Intervention and Control Groups**

| Knowledge variable | Intervention (N = 146) | Control (N = 145) | Test statistic | p-value |
|---|---|---|---|---|
| Nutrition knowledge score (mean ± SD) | 32.33 ± 6.26 | 33.46 ± 5.18 | t = -1.672 | 0.096 |
| Poor nutrition knowledge, n (%) | 124 (84.9) | 117 (80.7) | $\chi^2 = 0.646$ | 0.422 |
| Good nutrition knowledge, n (%) | 22 (15.1) | 28 (19.3) | | |
| WASH knowledge score (mean ± SD) | 28.39 ± 5.30 | 29.54 ± 4.92 | t = -1.926 | 0.055 |
| Poor WASH knowledge, n (%) | 65 (44.5) | 52 (35.9) | $\chi^2 = 1.923$ | 0.166 |
| Good WASH knowledge, n (%) | 81 (55.5) | 93 (64.1) | | |

From Table 1 above, at baseline, intervention and control groups had comparable nutrition knowledge (15.1% vs 19.3%; p = 0.422), though the control group showed slightly higher WASH knowledge group (29.54 ± 4.92 vs 28.39 ± 5.30; p = 0.055). The endline nutrition knowledge improved in the intervention group (35.27 ± 6.59 vs 34.35 ± 6.22), while the WASH knowledge (31.94 ± 5.63 vs 32.56 ± 5.76) remained comparable between both study groups. This could be attributed to the intervention program received in the intervention group, and falls in line with nutrition education being a functional tool in providing adequate nutritional information [4].

**Table 2: Change in Nutrition and WASH Knowledge within the Intervention and Control Groups at Endline (paired analysis, n = 113)**

| Nutrition knowledge | Baseline | Endline | Mean change | Test statistic | p-value |
|---|---|---|---|---|---|
| Score (mean ± SD) (intervention group) | 32.54 ± 5.44 | 35.27 ± 6.59 | +2.73 | t = 3.622 | <0.001 |
| Good knowledge (intervention group), n (%) | 13 (11.5) | 45 (39.8) | | McNemar | <0.001 |
| Poor knowledge (intervention group), n (%) | 100(88.5) | 68(60.2) | | McNemar | <0.001 |
| Score (mean ± SD) (control group) | 33.38 ± 5.14 | 34.35 ± 6.22 | +0.97 | t = 1.362 | 0.176 |

| | | | | | |
|---|---|---|---|---|---|
| Good knowledge (control group), n (%) | 20 (15.6) | 35 (27.3) | | McNemar | 0.036 |
| Poor (<60%) | 108(84.4) | 93(72.7) | | | 0.036 |
| WASH Score (mean ± SD) | 28.53 ± 5.39 | 31.94 ± 5.63 | +3.41 | t = 4.954 | <0.001 |
| Good knowledge, n (%) | 65 (57.5) | 81 (71.7) | | McNemar | 0.036 |

Table 3 showed significant ($p < 0.001$) improvement in the nutrition knowledge of the intervention group, but no significant ($p = 0.176$) improvement in control group's nutrition knowledge, highlighting the intervention's effectiveness. WASH knowledge also improved significantly ($p < 0.001$). The results show that education has a great role in determining the ability to understand food-related information, and awareness, and stresses the importance of nutrition education in promoting food literacy and encouraging healthier behaviours [4].

## CONCLUSION AND RECOMMENDATION

Overall, the findings demonstrate that school-based nutrition education effectively improved adolescents' nutrition knowledge and should be strengthened with behaviour-change strategies to promote healthier dietary practices.

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**SUB THEME:** ADOLESCENT NUTRITION AND HEALTH: CHARACTERISTICS, RISK FACTORS, AND OPPORTUNITIES OF AN OVERLOOKED LIFE STAGE

# **TITLE**: DIETARY PATTERN AND ANTHROPOMETRIC CHARACTERISTICS OF ADOLESCENTS IN ABEOKUTA NORTH LOCAL GOVERNMENT, OGUN STATE

*Adewunmi A. S.[1], Awoyemi O. M.[2]

[1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta

[2]Department of Human Nutrition and Dietetics, Afe Babalola University, Ado-Ekiti

*Corresponding author Email / phone number: adewunmianuoluwapo63@gmail.com / +2348143807198

**Keywords:** dietary patterns, adolescents, anthropometry

## Highlights

- Daily consumption of both healthy foods and sugar sweetened beverages was common among adolescents.
- Most adolescents had normal nutritional status, although underweight, overweight and obesity were present.

## Background and objectives

Adolescents are considered as a nutritionally vulnerable subgroup characterized by rapid physical growth and increased nutrients requirements [1]. Knowledge of a healthy dietary pattern in adolescence is an investment in present and future health. The objective of this study was to assess the dietary pattern and anthropometric characteristics of adolescent in Abeokuta North Local Government Area of Abeokuta, Ogun State.

## Materials and methods

A descriptive cross-sectional study was conducted among 400 adolescents aged 10 – 19 years from 5 wards selected through multi stage sampling. Socio demographic characteristics, dietary patterns and anthropometric measurements were collected using a food frequency questionnaire and standard procedures. Data obtained were analyzed using descriptive and inferential statistics.

## Results and discussion

**Table 1:** Notable results from the research

| **Variables** | **Frequency (n=400)** | Percentage (%) |
|---|---|---|
| **Weight status** | | |
| Underweight | 16 | 4 |
| Healthy Weight | 351 | 87.8 |
| Overweight | 22 | 5.5 |
| Obese | 11 | 2.8 |
| **Total** | **400** | **100** |
| **Food Consumption Pattern (Daily)** | **Frequency (Daily)** | **Percentage (%)** |
| **Food Items** | | |
| Rice | 214 | 53.50 |
| Bread | 87 | 21.75 |
| Yam | 244 | 61 |
| Beans | 242 | 60.5 |
| Eggs | 114 | 28.5 |
| Vegetables | 390 | 97.50 |
| Fruits | 377 | 94.25 |
| Fats and Oils | 188 | 47 |
| Confectioneries | 204 | 51 |
| Beverages | 253 | 63.25 |

A diverse dietary pattern emerged, with daily consumption of grains, roots, tubers, and fruits and vegetables, consistent with findings [2]. However, frequent intake of processed snacks and sweetened beverages was also observed, reflecting the global nutrition transition and its associated risks [3].

**Conclusion and recommendation**

Adolescents exhibited a mixed dietary pattern comprising both nutritious and energy-dense processed foods. Although malnutrition prevalence was relatively low, unhealthy dietary behaviors remain a public health concern, highlighting the need for nutrition education, improved dietary diversity and policies that promote health food choices.

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**THEME: DELIVERING BETTER NUTRITION FOR ALL: CONNECTING THE DOTS ACROSS LIFE CYCLE, SYSTEMS, & SECTORS**

**SUB THEME: INNOVATION IN CLINICAL NUTRITION PRACTICE ACROSS THE LIFE CYCLE: ALIGNING EVIDENCE-BASED PROTOCOLS WITH HEALTH SYSTEM DELIVERY**

# EVALUATING THE IMPACT OF DIETARY PATTERNS ON OBESITY AMONG SCHOOL-AGE CHILDREN IN EDUCATIONAL DISTRICT V, LAGOS STATE

Lano'Maduagu[1*], A.T., Quadri, J.A.[2], Awazie, B.O[1].

[1]Department of Technology and Vocational Education, University of Lagos, Akoka

[2]Department of Nutrition and Dietetics, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria

Corresponding Author Email: alano-maduagu@unilag.edu.ng

**Keywords:** Dietary patterns, Obesity, Parental influence, Food availability.

**Highlights:**

- Unhealthy dietary patterns were common among school-aged children.
- Poor dietary habits were significantly associated with higher BMI.
- Low fruit and vegetable intake increased obesity risk.

**BACKGROUND AND OBJECTİVES:** Childhood obesity has become a major public health concern globally, with unhealthy dietary patterns contributing significantly to its increasing prevalence among school-aged children (1). This study investigated the impact of dietary patterns on obesity among school-aged children in Educational District V, Lagos State. Specifically, it examined the relationship between dietary patterns and obesity, assessed the influence of food availability and parental dietary choices on children's nutritional status, and evaluated the role of school food environments in promoting healthy eating.

**MATERIALS AND METHODS:** A descriptive survey design was employed, and 200 school-aged children were randomly selected from primary schools in the district. Data were collected using a structured questionnaire assessing dietary habits and an anthropometric checklist for measuring weight and height to determine body mass index (BMI) according to WHO standards.

**RESULTS AND DISCUSSION:** The findings revealed a high prevalence of unhealthy dietary practices, characterized by frequent consumption of sugary snacks, soft drinks, and processed fast foods, alongside inadequate intake of fruits, vegetables, and whole grains. A significant positive relationship ($p < 0.05$) was observed between unhealthy dietary patterns and elevated BMI,

indicating that poor dietary habits increased the risk of overweight and obesity among the children, consistent with previous reports (1,2).

**Table 1: Parental Influence, Food Availability and Dietary Patterns**

| S/N | **Item** | **SA** | **A** | **N** | **D** | **SD** | **Mean**±SD |
|---|---|---|---|---|---|---|---|
| | **Parental Influence** | | | | | | |
| 11 | My parents often eat vegetables and fruits at home. | 58 | 66 | 28 | 28 | 20 | 3.17±1.31 |
| 12 | I eat similar meals as my parents most of the time. | 76 | 58 | 24 | 26 | 16 | 3.34±1.26 |
| 13 | My parents discourage me from eating too much junk food. | 82 | 60 | 22 | 24 | 12 | 3.44±1.22 |
| 14 | My parents encourage me to eat home-cooked meals. | 88 | 62 | 20 | 18 | 12 | 3.49±1.19 |
| 15 | My parents' eating habits influence my own food choices. | 74 | 64 | 22 | 24 | 16 | 3.36±1.17 |
| | **Food Availability** | | | | | | |
| 1 | My school serves meals that are nutritious and healthy. | 42 | 64 | 30 | 38 | 26 | 2.92±1.34 |
| 2 | I eat more snacks when healthy food is not available at school. | 76 | 66 | 20 | 24 | 14 | 3.40±1.23 |
| 3 | The availability of food vendors around the school affects what I eat. | 84 | 58 | 24 | 20 | 14 | 3.46±1.24 |
| 4 | I bring healthy food from home when school meals are not nutritious. | 60 | 62 | 26 | 30 | 22 | 3.15±1.33 |
| 5 | The food sold at or around my school contributes to weight gain. | 72 | 64 | 28 | 22 | 14 | 3.36±1.25 |
| | **Dietary Patterns** | | | | | | |
| 6 | I eat snacks and sugary foods more often than fruits and vegetables. | 65 | 54 | 28 | 34 | 19 | 3.12 ±1.32 |
| 7 | I eat late at night most days of the week. | 48 | 66 | 22 | 42 | 22 | 3.01±1.28 |
| 8 | I often feel tired or sleepy during the day after eating heavy meals. | 60 | 70 | 24 | 26 | 20 | 3.22±1.25 |
| 9 | I believe my eating habits affect my body weight. | 72 | 58 | 30 | 26 | 14 | 3.31±1.21 |
| 10 | I think children who eat junk food regularly are more likely to gain weight. | 90 | 62 | 18 | 18 | 12 | 3.56±1.17 |

**Scale:** SA = 5, A = 4, N = 3, D = 2, SD = 1

**Table 2: Comparison of Respondents' Mean BMI with WHO (2007) BMI-for-age Reference values**

| Age Group (yrs) | Total Frequency (n) | Mean BMI (kg/m²) | WHO 2007 Underweight cut-off | WHO 2007 Overweight cut-off | WHO 2007 Obese cut-off | WHO Category |
|---|---|---|---|---|---|---|
| 6 – 8 | 73 | 15.8 | ≤ 14.1 | ≥ 16.2 | ≥ 18.1 | Normal |
| 9 – 11 | 45 | 14.4 | ≤ 14.4 | ≥ 16.8 | ≥ 18.7 | Underweight |
| 12 – 14 | 38 | 23.0 | ≤ 14.9 | ≥ 17.5 | ≥ 19.6 | Obese |

**Table 3: Correlation between Food Availability, Parental Dietary Choices and Obesity Status (N = 200)**

| Relationship | Pearson r | p-value |
|---|---|---|
| Food Availability vs. Dietary Pattern Score | 0.372 | 0.001 |
| Food Availability vs. Obesity Level (BMI) | 0.291 | 0.004 |
| Parental Choices vs. Child's Diet Pattern | 0.428 | 0.000 |

| | | |
|---|---|---|
| Parental Choices vs. Child's Obesity (BMI) | 0.351 | 0.002 |

**CONCLUSION AND RECOMMENDATİON(S):** The study concludes that dietary behavior is a major determinant of childhood obesity. It recommends integrating nutrition education into the primary school curriculum, strengthening parental involvement in healthy feeding practices, and implementing school-based policies that promote healthier food environments to reduce the burden of childhood obesity.

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# SUB-THEME 5: ORAL

**Sub-theme:** Precision Nutrition and Nutrients: Making the Promise a Reality

**Title:** Preparation and Evaluation of a Non-Dairy Yoghurt Fortified with Chia Seed

**Name of Author (s): ***Adekolujo O.B1 Adesina T.O1, Omoregbe J.O1

**Affiliation of Author (s):** Department of Human Nutrition and Dietetics, Lead City University, Ibadan.

* **Corresponding author email:** adekolujo.oluwadamilola@lcu.edu.ng

**Keywords:** Coconut yoghurt, Chia seed, Fortification, Non-dairy yoghurt.

**Highlights**

- Coconut yoghurt was successfully prepared and fortified with chia seed.
- Chia seed fortification improved protein, omega-3 and micronutrient.
- Fortified yoghurt showed better nutritional and microbiological quality.

**BACKGROUND AND OBJECTİVES:** Demand for plant-based dairy alternatives has increased due to lactose intolerance, cow's milk allergy, vegan dietary patterns, and sustainability concerns [1]. Coconut milk is a suitable base for non-dairy yoghurt but has relatively low protein and micronutrient contents [2]. Chia seed (Salvia hispanica L.) is rich in protein, dietary fibre, omega-3 fatty acids, vitamins and minerals [3]. Despite increasing research on plant-based yoghurt alternatives, limited studies have evaluated chia seed fortification in coconut-based yoghurt systems. This study aimed to prepare coconut-based non-dairy yoghurt fortified with chia seed and evaluated its nutritional, physicochemical and microbiological properties.

**MATERIALS AND METHOD:** Five yoghurt formulations were produced: standard dairy yoghurt (control), 100% coconut yoghurt, and coconut yoghurt fortified with 7%, 14% and 21% chia seed. Samples were prepared using standard yoghurt production procedures, stored under refrigeration, and analysed for proximate composition, physicochemical properties, minerals, vitamins, omega-3 fatty acids and microbiological quality using standard analytical methods.

**RESULTS AND DISCUSSION:**

**TABLE 1: Proximate Analysis of Yoghurt Samples**

| SAMPLE | DY | CY | CCY1 | CCY2 | CCY3 |
|---|---|---|---|---|---|
| PARAMETERS | | | | | |
| Crude Protein % | 3.50 | 2.53 | 2.78 | 3.07 | 3.30 |
| Crude Fat/Lipid % | 3.30 | 1.78 | 1.90 | 2.11 | 2.19 |
| Crude Fibre % | 0.00 | 0.75 | 0.64 | 0.45 | 0.38 |
| Ash % | 0.75 | 0.95 | 0.85 | 0.69 | 0.61 |
| Moisture % | 88.50 | 76.70 | 76.56 | 76.29 | 76.23 |
| Carbohydrate % | 4.70 | 17.29 | 17.28 | 17.38 | 17.29 |
| Energy(kcal/ml) | 0.62 | 0.88 | 0.95 | 1.05 | 1.11 |

DY - Dairy Yoghurt, CY- Chia Yoghurt CCY - Chia-Coconut Yoghurt

**TABLE 2: Miconutrients Analysis and Microbial Properties of Yoghurt Samples**

| SAMPLE | DY | CY | CCY1 | CCY2 | CCY3 |
|---|---|---|---|---|---|
| PARAMETERS | | | | | |
| % Calcium | 0.12 | 0.050 | 0.127 | 0.117 | 0.124 |
| % Omega-3-Fatty Acid | 0.05 | 0.00 | 0.71 | 0.81 | 1.00 |
| Fe(mg/kg) | 0.05 | 0.15 | 0.26 | 0.37 | 0.46 |
| Vit.A(IU/100g) | 140.00 | 220.00 | 234.00 | 256.00 | 260.49 |
| Vit.D(IU/100g) | 10.00 | 165.00 | 169.00 | 176.00 | 177.70 |
| pH | 4.40 | 4.74 | 4.58 | 4.26 | 4.18 |
| %Titrable Acidity | 1.00 | 0.220 | 0.216 | 0.230 | 0.240 |
| Tvc(cfu/ml) | $10 \times 10^7$ | $3.55 \times 10^7$ | $3.87 \times 10^7$ | $4.10 \times 10^7$ | $4.27 \times 10^7$ |
| Lab Count(cfu/ml) | $100 \times 10^4$ | $2.35 \times 10^4$ | $2.59 \times 10^4$ | $2.82 \times 10^4$ | $2.93 \times 10^4$ |

DY - Dairy Yoghurt, CY- Chia Yoghurt CCY - Chia-Coconut Yoghurt

Chia seed fortification significantly improved nutritional quality, particularly protein, iron, omega-3 fatty acids, and vitamins A and D. The 21% formulation (CCY3) showed the highest overall nutritional enhancement. pH decreased with increasing fortification, while titratable acidity slightly increased. LAB and total viable counts increased across fortified samples, indicating support for beneficial microbial growth.

**CONCLUSION AND RECOMMENDATİON(S):** The study successfully prepared coconut-based non-dairy yoghurt and evaluated the effect of chia seed fortification. Fortification improved nutritional composition, particularly protein, iron, omega-3 fatty acids, vitamins A and D, while maintaining acceptable quality attributes. The 21% chia formulation showed the highest improvement. Further studies should include sensory evaluation, consumer acceptability, and storage stability.

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Sub-theme: Precision Nutrition and Nutrients: Making the Promise a Reality

# The Phyto-Nutritional Composition and Antihypertensive Effects of *Sida acuta* Leaf Extract in Wistar Rats

Akinola O.O[1], Oyinloye O.D[1,] AbdulKareem M.O[1], Akinyemi A.O[2], Oguntade O.I[1], Ajiboye O[1], , Mosimabale M.M[1], AbdulKareem S, Oduntan O.O[2], Orji I.G[1] Ogbonna O.C

[1]Department of Nutrition and DieteticsFederal Polytechnic Ede, Osun State, Nigeria,

[2]Department of Nutrition and Dietetics, Osun State University, Osogbo, Obafemi Awolowo University Teaching Hospital Complex, Ile ife, Nigeria

Corresponding Author: ooakinola@yahoo.com +2348033951165

**Introduction**: Sida acuta Burm. f. (Malvaceae), commonly known as broom weed is a widely distributed ethnomedicinal plant reported in traditional systems across Africa, Asia, and the Americas (1). This study aimed to evaluate the antihypertensive potential of Sida acuta extracts and their effects on electrolyte balance and renal function in hypertensive Wistar rats.

**Methodology:** Freshly harvested aerial parts of *Sida acuta* were rinsed thoroughly with tap water followed by distilled water to remove debris and surface contaminants, then spread in a single layer on stainless steel trays to ensure uniform airflow and then oven-dried at 40–45°C in a forced-air oven until a constant weight was achieved, cooled in a desiccator, and subsequently milled into a fine powder using a laboratory mill. The extracts filtered, concentrated under reduced pressure stored at 4 °C until use (2). Two groups' wistar rats were acclimatized for one week before experimentation. The experimental group was fed a sodium-rich diet (8% NaCl incorporated into standard feed) for four weeks to induce hypertension, while the control group received standard diet only. Upon confirmation of hypertension, *Sida acuta* extract was administered orally at a dose determined from preliminary phytochemical and toxicity studies, the administration of *sida acuta* for treatment lasted for 21 days, during which systolic and diastolic blood pressure were measured weekly using a tail-cuff method. The serum biochemical parameters including Creatinine, Sodium, Potassium, Chlorine and Hydrogen carbonate were measured.

**Results** Baseline and post-induction data revealed that hypertension induction caused a marked increase in serum sodium concentration (from 138.00 to 142.83 mmol/L) and a significant reduction in serum chloride (from 130.50 to 102.83 mmol/L), while serum creatinine showed a slight decrease (48.50 to 47.50 µmol/L), Serum potassium levels also declined post-induction (5.17 to 4.73 mmol/L). During the treatment phase, administration of Sida acuta led to a reversal of post-induction potassium depletion, with levels increasing to 5.73 mmol/L, and a reduction in sodium levels to 135.83 mmol/L, suggesting improved sodium handling. Chloride levels remained low (98.61 mmol/L), and serum creatinine remained stable (48.33 µmol/L).

**Table 2: Baseline and Post-Induction Serum Creatinine and Electrolyte Levels in Experimental Rats**

| Statistic | Initial Creatinine | Initial Potassium | Initial Sodium | Initial Chloride | Initial $HCO_3$ | Induced Creatinine | Induced Potassium | Induced Sodium | Induced Chloride | Induced $HCO_3$ |
|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 48.500 | 5.1667 | 138.0000 | 130.5000 | 18.8333 | 47.5000 | 4.7333 | 142.8333 | 102.8333 | 19.1667 |
| Std. Deviation | .5000 | .05774 | 1.00000 | 52.82755 | .76376 | .50000 | .05774 | 1.04083 | .76376 | .76376 |

**Table 2: Comparative Mineral (Electrolyte) Profile of Experimental Rats across Induction and Treatment Phases**

| Statistic | Creatinine (Treatment) | Potassium (Treatment) | Sodium (Treatment) | Chloride (Treatment) | Hydrogen Carbonate (Treatment) | Potassium (Induced) | Sodium (Induced) | Chloride (Induced) | Hydrogen Carbonate (Induced) |
|---|---|---|---|---|---|---|---|---|---|
| Mean | 48.3333 | 5.7333 | 135.8333 | 98.6111 | — | 4.7333 | 142.8333 | 102.8333 | 19.1667 |
| Std. Deviation | .50000 | .11180 | 1.45774 | 2.48468 | — | .05774 | 1.04083 | .76376 | .76376 |

**Conclusion**: In conclusion, Sida acuta demonstrates promising antihypertensive effects through modulation of electrolyte balance and preservation of renal function in an experimental hypertension model.

**Recommendation:** Long-time studies are recommended to investigate different doses of *Sida acuta* extract to establish the most effective and safest potential use as antihypertensive compound.

**Keywords:** Sida acuta, Hypertension, Electrolyte Balance, Renal Function.

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**Sub-theme: Precision Nutrition and Nutrients: Making the Promise a Reality**

# Title: Nutraceutical Potential of *Curcuma longa* and *Piper nigrum*: Synergistic Modulation of Oxidative Stress in an Indomethacin-Induced Gastric Ulcer Model

*Okechukwu, E.M.[1], Alilonu, D.O.[1] and Uchegbulam, V.O.[2]

[1] Department of Biochemistry, Alex Ekwueme Federal University, Ndufu-Alike, P.M.B. 1010, Abakaliki, Ebonyi State, Nigeria.
[2] Department of Physiology, Faculty of Basic Medical Sciences, Ebonyi State University, Abakaliki, Nigeria.
*Corresponding Author's contact:ezinneokechukwu17@gmail.com. Tel: 07032723931

**Keywords**: *Curcuma longa*; *Piper nigrum*; Nutraceuticals; Precision nutrition.

## Highlights

- Combined extracts improved antioxidant defence in gastric ulceration.
- Curcumin and piperine synergistically restored catalase activity.

## Background and Objectives:

Food-derived bioactive compounds have attracted increasing interest as nutraceuticals for the prevention of oxidative stress-mediated gastric mucosal damage (1). This study evaluated the antioxidant potential of *Curcuma longa* (turmeric) and *Piper nigrum* (black pepper), individually and in combination, on oxidative stress markers in indomethacin-induced gastric ulceration in Wistar rats.

## Materials and Method:

*Curcuma longa* rhizomes and *Piper nigrum* fruits were extracted with 70% ethanol. Sixty Wistar rats were randomized into six groups (n = 10): normal control, ulcerated control, omeprazole (20 mg/kg), *Curcuma longa* (200 mg/kg), *Piper nigrum* (100 mg/kg), and their combination (200 + 100mg/kg; 2:1 ratio). Treatments were administered orally for 21 days before ulcer induction with indomethacin (50 mg/kg).Gastric mucosal tissue homogenates were used for the determination of Catalase, Superoxide dismutase and Malondiadehyde levels by spectrophotometric methods. Data were analysed by one-way ANOVA ($p< 0.05$).

**Results and Discussion:**

**Table1**: **Effect of *Curcuma longa*, *Piper nigrum* and their combination on oxidative stress markers in indomethacin-induced gastric ulceration in Wistar rats.**

| Parameters | Group A | Group B | Group C | Group D | Group E | Group F |
|---|---|---|---|---|---|---|
| CAT (U/mg) | 0.40 ± 0.01$^{a,c}$ | 0.57 ± 0.02$^{*,b,c,d,e}$ | 0.41 ± 0.01$^{a,c}$ | 0.48 ± 0.01$^{*,a,b,d,e}$ | 0.39 ± 0.01$^{a,c}$ | 0.40 ± 0.01$^{a,c}$ |
| SOD (U/mg ) | 165.40 ± 6.95$^{a,b,c,d,e}$ | 260.50 ± 5.21$^{*,b,c,d}$ | 202.80 ± 6.48$^{*,a,e}$ | 196.20 ± 3.61$^{*,a,e}$ | 207.40 ± 4.11$^{*,a,e}$ | 238.25 ± 3.75$^{*,b,c,d}$ |
| MDA (nmol/mg protein) | 0.27 ± 0.02$^{a}$ | 0.67 ± 0.02$^{*,b,c,d,e}$ | 0.27 ± 0.01$^{a}$ | 0.25 ± 0.01$^{a}$ | 0.20 ± 0.01$^{a}$ | 0.27 ± 0.02$^{a}$ |

Values are expressed as mean ± SEM, n = 10. CAT: Catalase; MDA: Malondialdehyde; SOD: Superoxide dismutase. Values with different supersripts are statistically significant ($p$<0.05).

Indomethacin significantly increased CAT, SOD and MDA levels ($p$< 0.05). Pretreatment with *Curcuma longa* and *Piper nigrum* significantly reduced MDA, while the combined extract restored CAT activity closer to normal than the individual extracts, suggesting enhanced antioxidant activity. These findings support previous reports on the antioxidant and gastroprotective effects of curcumin and piperine (3,4)

**Conclusion and Recommendation:**

Combined *Curcuma longa* and *Piper nigrum* improved oxidative stress markers in indomethacin-induced gastric ulceration, highlighting their potential as food-derived nutraceuticals for promoting gastrointestinal health. Further studies are recommended to validate these findings in humans.

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**Sub-theme:** Precision Nutrition and Nutrients: Making the Promise a Reality

# Effects of Dietary Baobab (*Adansonia digitata* L.) Leaf Supplementation on Serum CEA, Oxidative Stress and Haematological Indices in MNU-Exposed Wistar Rats

Sani, I.M.[1,3], Muhammad, A.*[1], Chechet, G.D.[1], Aminu, S.[1], Emmanuel, O.O.[1], Abdullahi, A.M.[3], Atawodi, S.E.[2]

[1]Department of Biochemistry, Faculty of Life Science, Ahmadu Bello University, Zaria, Nigeria.

[2]Department of Biochemistry, faculty of Science, Federal University Kogi, Kogi State, Nigeria.

[3]Department of Biochemistry and Molecular Biology, Faculty of Science, Zamfara State University, Talata Mafara, Nigeria.

***Corresponding author:** amachida31@gmail.com; +2347038161430

**Keywords:** *Adansonia digitata*; dietary supplementation; N-methyl-N-nitrosourea; oxidative stress

## HIGHLIGHTS

Baobab diets reduced serum CEA by 68.7–83.5% in MNU-exposed rats.

Five percent (5%) Baobab produced the highest colonic SOD activity.

Ten percent (10%) Baobab reduced colonic MDA to the normal-control level.

## BACKGROUND AND OBJECTIVES

Baobab (*Adansonia digitata* L.) leaves also known as Kuka in Hausa, Ose in Yoruba and Ugbogulu in Igbo are consumed as food in many African settings and contain bioactive constituents with antioxidant potential [1]. However, evidence on dietary Baobab leaves against carcinogen-associated biochemical alterations is limited. This study evaluated graded Baobab leaf supplementation on serum carcinoembryonic antigen (CEA), colonic oxidative-stress markers and haematological indices in N-methyl-N-nitrosourea (MNU)-exposed rats.

## MATERIALS AND METHOD

Thirty-five male Wistar rats were assigned to a normal control (n = 7) or MNU-exposed cohort (n = 28). MNU (2.4 mg/0.2 mL) was administered intrarectally three times weekly. After four weeks, exposed rats received no supplementation or diets containing 2.5%, 5.0% or 10.0% Baobab leaf powder (n = 7/group) for eight weeks while MNU exposure continued. Serum CEA, colonic superoxide dismutase (SOD), malondialdehyde (MDA) and haematological indices were

measured. Data were analysed by one-way ANOVA with Duncan's test ($P < 0.05$). Ethical approval was obtained (ABUCAUC/2020/44).

## RESULTS AND DISCUSSION

At week 4, serum CEA was higher in MNU-exposed rats than in normal controls (54.57 ± 6.40 versus 18.40 ± 3.25 pg/mL; $P < 0.05$). At week 12, each Baobab diet lowered CEA and MDA and increased SOD relative to untreated MNU rats (Table 1). The 5.0% diet produced the greatest CEA reduction (83.5%) and highest SOD activity; the 10.0% diet produced the lowest MDA. MNU lowered haemoglobin and haematocrit but increased MCV. Supplemented groups had haematocrit values comparable with normal controls, although other haematological responses varied. The redox pattern is consistent with findings from another antioxidant-rich indigenous food tested in MNU-exposed rats [2].

**Table 1: Selected biochemical outcomes after 12 weeks**

| Outcome | Normal control | MNU control | MNU + 2.5% | MNU + 5.0% | MNU + 10.0% |
|---|---|---|---|---|---|
| **CEA (pg/mL)** | 19.75 ± 2.25$^{a}$ | 257.27 ± 17.57$^{b}$ | 80.60 ± 14.21$^{c}$ | 42.37 ± 8.53$^{d}$ | 45.08 ± 3.34$^{d}$ |
| **SOD (U/mg protein)** | 1262.48 ± 86.01$^{a}$ | 1052.39 ± 72.83$^{b}$ | 1292.39 ± 41.30$^{a}$ | 2445.24 ± 60.75$^{d}$ | 1658.91 ± 83.12$^{c}$ |
| **MDA (ng/mg protein)** | 40 ± 17$^{a}$ | 386 ± 17$^{b}$ | 150 ± 9$^{c}$ | 66 ± 2$^{a}$ | 41 ± 7$^{a}$ |

Values are mean ± SD (n = 7). Different superscripts within a row indicate $P < 0.05$.

## CONCLUSION AND RECOMMENDATIONS

Dietary Baobab leaf supplementation attenuated MNU-associated changes in serum CEA and colonic oxidative-stress indices. The 5.0% diet produced the most consistent biochemical response. Histopathology and validated tumour outcomes are recommended before colorectal-cancer prevention is inferred.

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**Subtheme:** Precision Nutrition and Nutrients: Making the Promise a Reality

**Title of paper:** Preclinical Trial of Avocado Pulp supplementation in an L-NAME Model of Cardiovascular Injury

**Name of Authors**: Joy A.C. Amadi,[1] Oluchi A. Aloy-Amadi.,[2] Chukwuma H. Chukwu[3] and Ibeaja, J. A[4]

**Affiliation of Authors**: [1] Department of Human Nutrition and Dietetics, Imo State University, Owerri
[2] Department of Medical Laboratory Science, Imo State University, Owerri, Nigeria
[3]Department of Anatomy and Neurobiology, Faculty of Basic Medical Sciences, Imo State University Owerri.
[4]Department of Nutrition and Dietetics, Federal Teaching Hospital Owerri, Imo State.

[*]**Corresponding author:** *drjoyamadi@gmail.com*
**Keywords:** Avocado, Cardiovascular, endothelial, dyslipidemia

## Highlights

- Avocado supplementation improves lipid balance, cardiac integrity, and vascular function in L-NAME–induced injury.
- Contour and network analyses reveal avocado disrupts maladaptive biomarker couplings and restores control-like organization.
- Preclinical evidence supports avocado as a nutraceutical adjunct for integrated cardiometabolic protection.

**Background and Objectives**

Endothelial dysfunction, dyslipidemia, and myocardial injury are major contributors to cardiovascular disease. Avocado (*Persea americana*), rich in monounsaturated fatty acids and phytochemicals, has shown lipid-lowering and anti-inflammatory properties, but its integrated effects on vascular injury remain unclear (1-3). Current pharmacological therapies such as β-blockers, renin-angiotensin system inhibitors, and statins reduce risk and improve outcomes, yet residual cardiovascular risk remains high. (4,5). This underscores the urgent need for novel interventions that can act through complementary mechanisms to restore vascular health and mitigate multi-organ complications. We investigated the effect of avocado supplementation on L-NAME-induced hypertension and multi-organ injury in a rat model of nitric oxidize synthase inhibition, and to provide proof-of-concept evidence supporting its potential role in cardiovascular and metabolic disease prevention.

**Methods**

Male rats were randomized into six groups (n = 4 per group): control (normal chow, water only), avocado (normal chow + avocado + water only), L-NAME, L-NAME+drugs (metoprolol+losartan), L-NAME+avocado, and L-NAME+drugs+avocado (Group 1 to 6 respectively). Morphometric indices, lipid profiles, cardiac injury enzymes, and vascular biomarkers were measured after treatment. One-way ANOVA with Tukey's test assessed group differences, while contour plots and correlation networks visualized biomarker interactions.

**Results**

L-NAME treatment to groups 3 to 6 induced a pathological phenotype characterized by reduced feed efficiency (–40%), weight gain (–80%), and BMI (–18%), together with dyslipidemia (LDL +120%, TG +55%, TC +42%, HDL –28%), myocardial stress (troponin +70%, CK +50%, LDH +35%), and vascular activation (endothelin +350%, VCAM-1 +55%, AngII +80%; all $p < 0.01$). Avocado supplementation

mitigated these effects: BMI and feed efficiency returned to near-control levels, LDL, TG, and TC fell by 30–45%, and troponin, CK, and LDH decreased by ~25–30%. Endothelin, VCAM-1, and AngII were reduced by 40–55% relative to L-NAME. Network analysis revealed dense pathological correlations under L-NAME (density 0.42), simplified under avocado (0.17), and most normalized with avocado+drugs (0.09), indicating restoration of physiological biomarker independence.

**Conclusion and Recommendation**

Avocado supplementation attenuates L-NAME–induced vascular injury by improving metabolic efficiency, correcting dyslipidemia, reducing cardiac injury, and dampening endothelial activation, while proposing a potential capacity to shift pathological biomarker network towards a more control-like organization in such a preclinical proof-of-concept- study. to delineate dose-response relationships. Mechanistic studies should focus on identifying the bioactive compounds responsible for avocado's cardioprotective actions, particularly their influence on nitric oxide signaling, lipid metabolism, and inflammatory pathways.

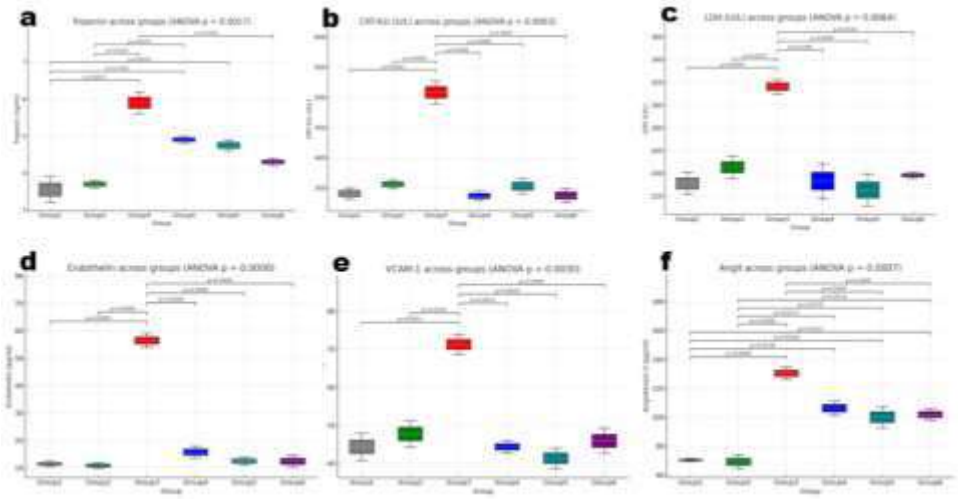



Figure 1. Effects of avocado supplementation and pharmacological treatment on cardiac integrity and vascular injury markers in L-NAME–induced vascular damage model. Box plots show treatment group distributions (n = 4 per group) for (a) troponin, (b) creatine kinase (CRT-Kin), (c) lactate dehydrogenase (LDH), (d) endothelin, (e) vascular cell adhesion molecule-1 (VCAM-1), and (f) angiotensin II (AngII). Groups: Group 1 = Control (normal diet); Group 2 = Avocado only; Group 3 = L-NAME; Group 4 = L-NAME + drugs (metoprolol + losartan); Group 5 = L-NAME + avocado; Group 6 = L-NAME + drugs + avocado. Horizontal brackets indicate pairwise group comparisons with p-values derived from Tukey's HSD post-hoc test following one-way ANOVA. Significant group differences ($p < 0.05$) are annotated.

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**Sub-Theme: Precision Nutrition and Nutrients:** Making the Promise a Reality

# Proximate Composition and Antioxidant Activity of Whole Wheat Bread, Pure Wheat Bread and African Locust Bean (Parkia biglobosa) Composite Wheat Bread

**Authors**: Oseki, O.P.[1], Patrick-Iwuanyanwu, K.C.[2], Ikewuchi, C.C.[3], Ezim, O.E.[4]

[1234]Center of Excellence in Public Health and Toxicological Research, University of Port Harcourt, Nigeria, oseki_peter@uniport.edu.ng, 07031842352

**Keywords**: Parkia biglobosa, proximate composition, antioxidant activity, composite bread

**Highlights:**

- 15% P. biglobosa raised ash, protein, fibre and DPPH scavenging.
- AOAC 2000 proximate and DPPH/FRAP/TAC assays were employed.
- WWB and PWB similarity suggests commercial bread authenticity.

**Background:**

Parkia biglobosa (African locust bean) is rich in protein, minerals and antioxidant bioactives. However, there is limited evidence on its combined effect on both proximate composition and antioxidant activity of wheat bread. Hence, this studies to assess authenticity and nutritional contribution of P. biglobosa.[1][3]

**Material & Methods:**

Three bread types were evaluated: WWB (100% wheat, purchased commercially), PWB (100% wheat, prepared in the laboratory), and CWB (85% wheat flour + 15% P. biglobosa flour). CWB and PWB were produced using the straight dough method according to Idowu and Ojo (2024).[3] Proximate composition was determined according to AOAC (2000) [2].

In-vitro antioxidant assays were conducted using standard method.[5]. All determinations were done in triplicate. Data are presented as mean ± SEM and subjected to one-way ANOVA with Tukey's post hoc test using SPSS v27. Significance was accepted at $p \leq 0.05$.[4][5]

**Result:**

**Proximate compositions (%) of the feeds**

| Proximate Content | Whole Wheat Bread (WWB) | Pure Wheat Bread (PWB) 100% Wheat | Composite Wheat Bread (CWB) 85% Wheat + 15% ALB |
|---|---|---|---|
| Moisture | $35.69 \pm 0.34^{a}$ | $54.10 \pm 0.80^{b}$ | $56.63 \pm 0.12^{c}$ |
| Ash | $2.80 \pm 0.10^{a}$ | $1.47 \pm 0.23^{a}$ | $3.27 \pm 0.09^{b}$ |
| Crude fibre | $7.17 \pm 0.04^{a}$ | $4.07 \pm 0.20^{b}$ | $5.23 \pm 0.48^{c}$ |
| Crude fat | $3.32 \pm 0.05^{a}$ | $1.16 \pm 0.05^{b}$ | $1.32 \pm 0.03^{c}$ |
| Crude protein | $8.00 \pm 0.04^{a}$ | $4.75 \pm 0.01^{b}$ | $5.10 \pm 0.05^{c}$ |
| Carbohydrate | $43.02 \pm 0.45^{a}$ | $35.12 \pm 0.48^{b}$ | $28.41 \pm 0.45^{c}$ |

Values are mean±SEM (n=3). Values in the same rows with different superscripts differ significantly at $p <= 0.05$

**Antioxidant indices of the diet**

| | Whole Wheat Bread | Pure Wheat Bread 100% Wheat | Composite Wheat Bread 85% Wheat + 15% ALB |
|---|---|---|---|
| 2.2 Diphenyl -1-picryl-hydrazyl (DPPH) | 55.93±1.91[a] | 62.94±4.24[a] | 66.17±7.21[a] |
| Ferric reducing antioxidant power (FRAP) | 34.97±2.51[a] | 29.27±1.87[a] | 34.07±1.35[a] |
| Total antioxidant capacity (TAC) | 65.65±1.85[a] | 85.40±3.14[a] | 84.56±4.95[b] |

Values are mean±SEM (n=3). Values in the same rows with different superscripts differ significantly at p<=0.05

**Conclusion and Recommendations:**

Fortification with 15% fermented P. biglobosa significantly enhanced ash, protein, fibre and antioxidant activity of wheat bread. This supports precision nutrition by improving staple foods with local crops. It is recommended that bakeries adopt P. biglobosa fortification for nutritionally enhanced bread. Further studies should evaluate sensory acceptability and in-vivo antioxidant effects.[3]

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**Sub-Theme:** Precision Nutrition and Nutrients: Making the Promise a Reality

**Title:** Qualitative and Quantitative Phytochemical Contents of Commercial Wheat Bread, Laboratory Wheat Bread and African Locust Bean (Parkia biglobosa) Composite Wheat Bread

**Authors**: Oseki, O.P.[1], Patrick-Iwuanyanwu, K.C.[2], Ikewuchi, C.C.[3], Ezim, O.E.[4]

[1234] Center of Public Health and Toxicological Research, University of Port Harcourt, Nigeria, oseki_peter@uniport.edu.ng, 07031842352

**Keywords**: Parkia biglobosa, phytochemicals, composite bread, quantitative content, phytochemical content

**Highlights**:

• 15% P. biglobosa raised flavonoids, terpenoids and cardiac glycosides.

• Both qualitative screening and quantitative assays were applied.

• Similar commercial wheat bread (CWB) and laboratory wheat bread (LWB) profiles indicate commercial bread authenticity.

**Background**:

Parkia biglobosa (African locust bean) contains bioactive phytochemicals and can serve as a functional ingredient. However, information on how P. biglobosa at practical levels affects the phytochemical profile of wheat bread is limited. This study therefore evaluated and compared the qualitative and quantitative phytochemical contents to assess authenticity and nutritional contribution.[1][2]

**Material & Methods:**

Three bread types were examined: CWB (100% wheat, commercial), LWB (100% wheat, lab-prepared), and CWB (85% wheat + 15% P. biglobosa flour). CWB and LWB were produced using the straight dough method as described by Idowu and Ojo (2024).[2]

Standard protocols with modification were used for qualitative screening. [3][4] while spectrophotometric methods were used for quantitative screening.[5]

All analyses were done in triplicate. Results are presented as mean ± SEM and compared using one-way ANOVA with significance at $p<0.05$.[3][4]

**Result:**

**Qualitative phytochemical profiles of the samples**

| Phytochemicals | Commercial Wheat Bread (CWB) | Laboratory Wheat Bread (LWB) | Composite Wheat Bread (85% Wheat + 15% ALB) |
|---|---|---|---|
| Tannins | Absent | Absent | Absent |
| Coumarin | Absent | Absent | Absent |
| Flavonoids | Present | Present | Present |
| Cardiac glycosides | Present | Present | Present |
| Saponins | Present | Present | Present |
| Steroids | Present | Present | Present |
| Terpenoids | Present | Present | Present |
| Phlobatanins | Absent | Absent | Absent |
| Alkaloids | Present | Present | Present |
| Anthraquinones | Absent | Absent | absent |
| Phenol | Absent | Absent | Absent |

**Quantitative of phytochemical compositions of the feed**

| Phytochemicals | Unit | Commercial Wheat Bread (CWB) | Laboratory Wheat Bread (LWB) | Composite Wheat Bread (85% Wheat + 15% ALB) |
|---|---|---|---|---|
| Flavonoids | 100ug/mL Quercetin | 0.975±0.007[a] | 0.829±0.002[b] | 1.731±0.003[c] |
| Terpenoids | 100ug/mL Beta-sitosterol | 1.090±0.004[a] | 1.071±0.002[b] | 1.223±0.003[c] |
| Cardiac glycosides | 100ug/mL Securidaside | 1.394±0.006[a] | 1.071±0.002[b] | 1.223±0.003[c] |
| Steroids | 100ug/mL Stigmasterol | 1.309±0.009[a] | 1.341±0.008[a] | 1.220±0.012[b] |
| Saponins | 100ug/mL Diosgenin | 0.058±0.002[a] | 0.055±0.001[a] | 0.035±0.001[b] |
| Alkaloids | 100ug/mL Atropine | 0.032±0.003[a] | 0.026±0.002[a] | 0.019±0.001[b] |

Values are mean±SEM (n=3). Values in the same rows with different superscripts differ significantly at p<=0.05

**Conclusion and Recommendations:**

Fortification of wheat bread with 15% fermented P. biglobosa significantly improved phytochemical content, especially flavonoids and terpenoids. This aligns with precision nutrition by enhancing staples with indigenous crops. It is recommended that bakeries adopt P. biglobosa fortification for nutritionally enhanced bread. Future studies should assess sensory properties and in-vivo bioactivity.[2][1]

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**Theme/sub-theme:** Precision Nutrition and Nutrients: Making the Promise a Reality

**Title:** Evaluation of the mineral, physical and chemical properties of enteral tube feeds administered in Jos University Teaching Hospital, Jos, Plateau State. Nigeria.

**Name of Author (s):** Akuirene, J. O.[1,2]*, Ikechukwu, S. A.[3], Akuirene, T. J.[4], Hanson, E. S.[1], Carey, M.[2], Malcom, M.[5], Curtis, T.[6], Barabas, P.[6], Ndiokwelu, C. I.[1], Ene-Obong, H. N.[1], Campbell, K.[2]

*[1]Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences, College of Medical Sciences, University of Calabar, Calabar, Nigeria.; [2]Institute for Global Food Security (IGFS), School of Biological Sciences, Queen's University Belfast, UK BT95DL; [3]Department of Dietetics, Federal Neuro-Psychiatric Hospital Calabar, Calabar, Cross River State. Nigeria.; [4]Department of Food Sciences and Microbiology, Faculty of Sciences, National Open University, Calabar Centre, Calabar, Nigeria. ; [5]School of Pharmacy, Queen's University Belfast, UK.; [6]The Wellcome-Wolfson Institute for Experimental Medicine, Queen's University Belfast, UK*

***Corresponding author:** joakus7@unical.edu.ng or akus7jo@gmail.com

**Keywords:** *Blenderized tube feeds, Hospital-prepared feeds, mineral composition, physiochemical properties*

**Highlights:**

- Higher mineral content of JOT-M-MIX and BRAN MIX may be explained by the inclusion of millet and acha (fonio), both of which are recognized sources of essential minerals.
- Observed significant differences in the physicochemical properties of the formulations

**Background and Objectives**: Enteral nutrition is the preferred route of nutritional support for patients with a functional gastrointestinal tract who are unable to meet their nutritional requirements orally [1]. Although hospital-prepared blenderized enteral feeds are widely used in Nigeria, evidence on their mineral composition and physicochemical properties is limited [2]. This study determine the mineral, physical and chemical properties of enteral tube feeds powder administered in Jos University Teaching Hospital, Jos Plateau State, Nigeria.

**Materials and Method**: This laboratory-based cross-sectional analytical study was conducted on three ready-to-use, sealed enteral feed powders procured from the Department of Nutrition and Dietetics, Jos University Teaching Hospital (JUTH), Jos, Nigeria. The formulations comprised DIETREND (maize:soybean:groundnut; 6:3:1), JOT-M-MIX (millet:soybean:groundnut; 6:3:1),

and BRAN MIX (Dietrend chaff:acha (fonio); 5:2). All samples were analysed in triplicate. Mineral composition was determined using an inductively coupled plasma-mass spectrometer (ICP-MS; Thermo Scientific iCAP TQ). Osmolality (mOsmol/kg) was measured using a Gonotec Osmometer, while viscosity was determined using a Brookfield DV-I+ viscometer in gruel prepared with 25g of the different powders in 250ml tap water. All analyses were performed according to standard analytical methods.

**Results and Discussion**: About 30 mineral elements were detected in all samples. Significant differences ($p < 0.05$) were observed in the mineral composition and physicochemical properties of the enteral feed powders. Compared with DIETREND, JOT-M-MIX and BRAN MIX contained higher magnesium (15.48–15.56 vs. 9.94 mg/100 g), phosphorus (25.97–26.45 vs. 22.24 mg/100 g), sulphur (15.59–16.25 vs. 9.09 mg/100 g), calcium (3.43–3.65 vs. 0.00 mg/100 g), copper (0.05–0.06 vs. 0.02 mg/100 g), and zinc (0.22–0.28 vs. 0.14 mg/100 g), while DIETREND had higher iron (0.60 vs. 0.50–0.57 mg/100 g) and iodine (0.05 vs. 0.02–0.03 mg/100 g). Several elements, including lithium, beryllium, vanadium, and others, were either absent or present in negligible amounts across all formulations. Physicochemical evaluation showed that DIETREND exhibited significantly higher viscosity at both 100°C (1644.00 vs. 180.70–289.14 cP) and 37°C (3661.33 vs. 936.00–1804.00 cP), while JOT-M-MIX and BRAN MIX exhibited lower viscosities. Osmolality immediately after preparation was lower in DIETREND (20mOsm/L) than in JOT-M-MIX and BRAN MIX (40mOsm/L), but after four days of storage, DIETREND recorded the highest value (100mOsm/L vs 60mOsmol/L). This study demonstrated significant differences in the mineral composition, viscosity, and osmolality of the three hospital-prepared enteral tube feed formulations administered at Jos University Teaching Hospital. These observed variation in the mineral and physicochemical properties of the formulations maybe of clinically relevant because elevated viscosity can impede flow through narrow-bore feeding tubes and increase the risk of tube occlusion, while higher osmolality can affect gastrointestinal tolerance and nutrient absorption.

**Conclusion and Recommendation**: Hospital-prepared enteral tube feed formulations differed in their mineral composition and physicochemical properties, reflecting the influence of ingredient composition and preparation methods. Standardizing these formulations and implementing routine

quality assessment could improve the nutritional quality, consistency, and safety of enteral feeding in Nigerian hospitals.

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# SUB-THEME 5: POSTER

**Theme/sub-theme:** Precision Nutrition and Health: Making the Promise a Reality

**Title:** Association of Angiotensin Converting Enzyme Gene Polymorphism Among Overweight Hypertensive Patients Attending Murtala Muhammad Specialist Hospital, Kano State, Nigeria

**Name of Author (s)**: *Muhammad Ali Gambo[1], Abdullahi Musa Hassan[2], Sani Yusuf Bindawa[3]

**Affliation of Author (s):** [1] Department of Integrated Science, Federal College of Education (T) Bichi, Kano, Nigeria, [2]Department of Primary Education Studies, Aminu Kano College of Islamic and Legal Studies, [3]National Board for Arabic and Islamic Studies

**Corresponding Author:** Muhammad Ali Gambo

**Phone Number**: +23407038417854

**Email:** muhammadcbn@gmail.com

**Keywords:** Angiotensin-converting enzyme (ACE) gene, Blood Pressure, Obesity, Anthropometric indices.

**Highlights:**

- ACE polymorphism is correlated with blood pressure in obese patients.
- Type ID showed highest systolic, Type DD showed highest diastolic pressure.
- Krustal-wallis test linked ACE genotype to BMI and Waist Circumference.

**BACKGROUND AND OBJECTIVES:**

One risk factor for high blood pressure is obesity. An enzyme called the angiotensin-converting enzyme (ACE) is responsible for vasoconstriction. It is possible that ACE gene insertion or deletion polymorphisms are linked to hypertension. The goal of this investigation is to identify a correlation between blood pressure and polymorphisms in the ACE gene in obese patients.

**MATERIALS AND METHOD:**

This study used cross-sectional, analytical, and observational methods. Overweight in- and out-patients from Murtala Muhammad Specialist Hospital comprised the study population. Patients who satisfied the following requirements were included: must be between the ages of 20 and 60, have a body mass index of 25 or above, have their Blood Pressure measured; Systolic Blood Pressure (SBP) greater than or equal to 140 mmHg and Diastolic Blood Pressure (DBP) greater than or equal to 90mmHg, and who are willing to participate in the study by signing an informed consent form. Patients who took antihypertensive medications were excluded from this study.

## RESULTS AND DISCUSSION:

**Table 1.** Factors associated with ACE gene polymorphism

| Parameters | II (n= 25) | ID (n=10) | DD (n= 5) | P - value |
|---|---|---|---|---|
| **Age** | 34.5 ± 6.3 | 44.1 ±12.5 | 48.5 ± 13.4 | 0.006 |
| **Systole** | 129.5 ± 21.1 | 142.3 ± 38.4 | 163.9 ± 61.3 | 0.002 |
| **Diastole** | 90.5 ± 16.3 | 101.4 ± 26.3 | 113.9 ± 36.3 | 0.004 |
| **BMI** | 32.1 ± 4.2 | 36.5 ± 5.1 | 40.2 ± 6.3 | 0.004 |
| **WC** | 105.2 ± 10.5 | 115.6 ± 12.8 | 125.9 ± 15.1 | 0.001 |
| **BAI** | 41.2 ± 5.5 | 45.9 ± 6.8 | 51.2 ± 8.2 | 0.003 |
| **MUAC** | 34.5 ± 4.8 | 38.2 ± 5.5 | 42.1 ± 6.8 | 0.006 |

**Table 2:** Association between ACE gene Polymorphism and anthropometric indices of overweight patients

| Parameters | BMI | WC | BAI | MUAC |
|---|---|---|---|---|
| II | 0.15 | 0.12 | 0.08 | 0.10 |
| ID | 0.32 | 0.35* | 0.28 | 0.30 |
| DD | 0.45* | 0.50* | 0.42* | 0.48* |

* Association is significant at $P < 0.05$ Level

Overweight is known to be a factor contributing to an increase in blood pressure [1]. However, genetic variations, lifestyle, and environment can also influence the relationship between ACE genes and blood pressure [2].

## CONCLUSION AND RECOMMENDATION:

The Angiotensin-Converting Enzyme (ACE) gene polymorphism in overweight patients among hypertensive patients attending Murtala Muhammad Specialist Hospital, Kano was found to be predominantly type II, with the least common type being DD. There was a relationship between blood pressure, anthropometric indices and polymorphism in these overweight patients.

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**Theme/sub-theme:** Delivering Better Nutrition For All: Connecting The Dots Across Life Cycle, Systems and Sectors / Precision Nutrition and Nutrients: Making the Promise a Reality.

**Title:** Contribution of Carotenoids and Retinoids to Vitamin A Intake in Nigeria.

**Name of Author:** *Afolami, J.I.[1], and Will, R.S.[1]

**Affiliation of Author (s):** [1]Department of Human Nutrition, University of Ibadan, Ibadan, Nigeria

*Corresponding author, e-mail: m.afolami@gmail.com, +2348135490693

**Keywords:** Retinoid, Carotenoids, Vitamin A intake, Nigeria

**Highlights:**

- Carotenoids were the major source of dietary vitamin A in Nigeria
- Vitamin A deficiency persists despite high carotenoid intake
- Regional disparities in vitamin A intake remain across Nigeria

**BACKGROUND AND OBJECTIVES:**

Vitamin A Deficiency (VAD) remains a major public health concern in Nigeria, despite the availability and consumption of carotenoid-rich foods by Nigerians [3]. For documentation purposes, there is a need to quantify the carotenoid and retinoid components of Nigerian diets and the relative contribution of carotenoid and retinoid to vitamin A intake. This study is thus aimed at estimating the contribution of carotenoids and retinoid to vitamin A intake in Nigerian diets, while focusing on dietary patterns across different socio-demographic regions.

**METHODOLOGY**

This research employed the scoping review methodology and adhered to the preferred Reporting Items for Systemic Reviews and Meta-Analyses Extension for Scoping Review (PRISMA -ScR). Relevant literature was systemically examined from five electronic databases: PubMed, Research Gate, Scopus, Science Direct, and Web of Science. Articles were selected based on the eligibility criteria. Data extraction involved summarizing key parameters. Numerical analysis was conducted using Microsoft Excel, with findings presented through tables and figures. [2]

## RESULTS AND DISCUSSION:

The study highlights that retinoid from animal-based foods contribute 27.6% of total vitamin A intake, while carotenoids from plant-based sources, such as fruits, vegetables, and red palm oil, account for approximately 72.4%. Notably, red palm oil alone contributes 51% of total vitamin A intake. However, VAD persists, especially among children under five, suggesting potential inefficiencies in carotenoid conversion, dietary variation, and bioavailability challenges. The study also reveals regional disparities, with lower vitamin A intake in the northern regions compared to the south. [1]

## CONCLUSION AND RECOMMENDATION:

This study emphasizes the need for targeted interventions like strengthening bio-fortification programs, promoting dietary diversity, and implementing strategic supplementation initiatives to improve vitamin A intake among vulnerable populations. Future research should focus on improving estimates of bioavailability, assessing the impact of cooking techniques on nutrient retention, and addressing socioeconomic barriers to vitamin A consumption.

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**SUB THEME 5: Precision Nutrition and Nutrients: Making the Promise a Reality**

# TITLE: ASSESSMENT OF SALT AND SUGAR INTAKES AND THEIR ASSOCIATION WITH HYPERTENSION AND DIABETES MELLITUS AMONG ADULTS IN MAKARFI TOWN, MAKARFI LGA, KADUNA STATE, NIGERIA

**AUTHORS**:
Agboola, F. O.[1,2], Owolabi, A. O.[2] and Umar, I. A.[2]
[1]Department of Nutrition and Dietetics, Shehu Idris College of Health and Sciences and Technology, Makarfi, Kaduna State, Nigeria
[2]Department of Biochemistry, Ahmadu Bello University, Zaria, Kaduna State, Nigeria
*Corresponding author Email:agboolafatai2017@gmail.com
**Keywords**: Salt Intake, Sugar Intake, Hypertension, Diabetes Mellitus

## BACKGROUND AND OBJECTIVES

Salt and sugar are prominent additives in many foods, enhancing the taste and acceptability of ready to eat food (Park *et al.,* 2020). World Health Organization (2020) recommends less than 5g of salt and less than 25g of sugar per day, as excess consumption can be harmful. In Nigeria, hypertension prevalence is estimated at 30% while diabetes affects 5–10% of the adult population (IDF, 2021). High salt and sugar intakes are associated with hypertension and in diabetes among other NCDs (WHO, 2021). The study assessed salt and sugar intakes and determines their association with hypertension and diabetes mellitus respectively among the adults in Makarfi Town, Kaduna State, Nigeria.

## MATERIALS AND METHODS

The research was carried out in Makarfi and Tudun Wada Wards of Makarfi town, Makarfi LGA, Kaduna State. The research designs used were cross-sectional descriptive and analytical procedures, involving quantitative method. Sample size of 400 was determined using Cochran Formula for cross-sectional studies (Cochran, 1977). However, multistage sampling procedure was used and finally Kish Grid template was adopted to select eligible adult per household.

A validated semi-structured questionnaire was used to obtain information on the socio-demographic characteristics of the adults in Makarfi town (age, sex, marital status, highest education attainment, estimated household monthly income). Reliable digital blood pressure monitor was used to measure the blood pressure of adults in Makarfi town at designated Health Centers, where they have been gathered in the morning (AHA, 2017) while random blood sugar was measured using digital glucometer (ADA, 2020) at the same venue and time. Data collected were analyzed using frequency distribution tables and percentages for inferential purposes.

However, *Fishers-Freeman Halton Exact Test* was used to determine the association between salt intake and hypertension as well as sugar intake and diabetes mellitus.

## RESULTS AND DISCUSSION

Table 1: Discretional Salt and Sugar Intakes and their relationships with Hypertension and Diabetes Mellitus among Adults in Makarfi Town, Makarfi LGA, Kaduna State

| **Salt Intake** | **NBP** | **Hytx** | **Total** | **p value** |
|---|---|---|---|---|
| <5g/day | 16 (4.0) | 2 (0.5) | 18 (4.5) | *0.001 |
| 5 – 9g/day | 156 (39.0) | 8 (2.0) | 164 (41.0) | |
| >9g/day | 96 (24.0) | 122 (30.5) | 218 (54.5) | |
| **Total** | **268 (67.0)** | **132 (33.0)** | **400 (100)** | |
| **Sugar Intake** | **NBS** | **Diabetes** | **Total** | **p value** |
| <25g/day | 25 (6.2) | 1 (0.25) | 26 (6.5) | 1.000 |
| 25 – 50g/day | 146 (36.5) | 0(0) | 146 (36.5) | |
| >50g/day | 227 (56.8) | 1(0.25) | 228 (57.0) | |
| **Total** | **398 (99.5)** | **2 (0.5)** | **400 (100)** | |

NBP=Normal Blood Pressure; Hytx= Hypertension; NBS= Normal Blood Sugar

The results showed 218 (54.5%) of adults in Makarfi town took >9g of salt per day and 228 (57.0%) took >50g of sugar per day which were both higher than WHO recommendation of less than 5g/day and 25g/day of salt and sugar respectively (WHO, 2020). The prevalence of hypertension was 33.0%, which is in accord with IDF (2021) affirming that prevalence of hypertension in Nigeria is 30% while that of diabetes mellitus was 0.5% which was in contrary with NCD Alliance in Nigeria (2022) stating that diabetes affect 8-10% of adults population. However, association existed between salt intake and hypertension (with p-value 0.001) while the sugar intake was not statistically significant with diabetes (with p-value 1.000).

## CONCLUSION AND RECOMMENDATION

The salt and sugar intake of adults in Makarfi town, Makarfi LGA of Kaduna State Nigeria were confirmed to be higher above WHO recommendation; the prevalence of hypertension and diabetes was 33.0% and 0.5% respectively; and salt intake was statistically significant with hypertension, while sugar intake was not associated with diabetes mellitus among the adults.

However, it is recommended that sodium and sugar intake be cautiously regulated by tax on processed foods especially sugar sweetened beverages (SSB) and adults are strongly advised to timely check their blood pressure and sugar levels.

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**Theme/Sub-theme**: Precision Nutrition and Nutrients: Making the Promise a Reality

**Title:** Assessment of Dietary Diversity and Nutrient Intake among School-aged Children in Calabar Metropolis.

**Name of Author(s): ***Adesuyan, A. J.,[1] Bessong, M.O.[1] and Ene-Obong, H. N.[2]

**Affiliation of Author(s):** [1]Department of Home Economics, University of Calabar, Calabar.

[2]Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences, University of Calabar, Calabar.

Corresponding author email: adeolajoan4@gmail.com.

+2348034564034

**Keywords:** School-aged children, Dietary diversity, Nutrient intake, Public and private schools.

**Highlights:**

- More (89.5%) SAC in the private school had high DDS than their counterpart (73.0%) in public schools.
- There was no significant (*p>0.05)* difference in the SAC daily energy and nutrient intake in both schools. Daily energy intake of 50.4% of the SAC was within Estimated Energy Requirement (EER) for age and gender.
- Majority, (66.4%) of the SAC in both schools had iron intake within and above 5% and 10% bioavailability recommended for developing countries. Calcium intake was below RNI for majority (84.1%) of the SAC in both schools.

**BACKGROUND AND OBJECTIVES:**

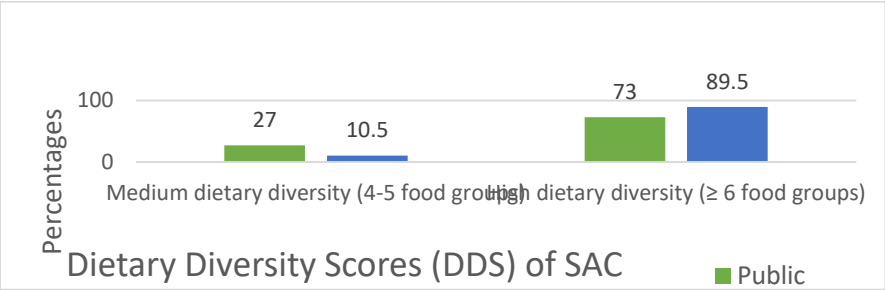
The school-aged period of 6-14 years represents an important developmental phase characterized by rapid physical, and cognitive, changes that place increased nutritional demands on growing bodies and brains. Insufficient food intake during this period has both long-term and short-term effect such as delayed physical development, and impaired cognitive development (1). Dietary diversity, a key indicator of high-quality diet is of particular interest to SAC due to their high nutrient's requirement for growth and development (2). Despite elevated nutritional needs, many school-aged children globally experience suboptimal dietary patterns that fail to meet their nutritional requirements. Therefore, the study assessed the dietary diversity and nutrient intake of SAC in Calabar Metropolis.

**MATERIALS AND METHODS:**

A cross-sectional study was conducted among 1136 SAC using multistage sampling technique. Nutrient intake and dietary diversity data were obtained through a multiple pass 24-hour recall for 10% of the study population. Data were analyzed using Statistical Package for Social Sciences (SPSS, version 21.0) for windows

## RESULTS AND DISCUSSION:

**Fig. 1: Dietary diversity score of school-aged children**




In fig. 1, majority (73.0 and 89.5%) of the SAC in both schools who participated in the 24-hour recall had high (DDS), which is similar to the findings reported by Omuemu *et al.* (3) where majority 90.9% of the school children had a high DDS (consumed ≥ 6 food groups).

**Table 1: Daily energy and nutrient intake of school-aged children compared with RNI**

| Nutrient intake | Nutrient Status | Public school N= 37(%) | Private school N= 76 (%) | Total N= 113 (%) | $X^2$ *(P-value)* |
|---|---|---|---|---|---|
| Energy (1575-2550kcal) | Below EER | 16(43.2) | 22(28.9) | 38(33.3) | **2.602** ***(.273)*** |
| | Within EER | 15(40.5) | 42(55.3) | 57(50.4) | |
| | Above EER | 6(16.2) | 12(15.8) | 18(16.0) | |
| | **Total** | **37(100)** | **76(100)** | **113(100)** | |
| Carbohydrate (130g) | Below RDA | 1(2.7) | 2(2.6) | 3(2.65) | **1.209 (*.797)*** |
| | Within RDA | | 3(3.9) | 3(2.65) | |
| | Above RDA | 36(97.3) | 71(93.4) | 107(94.7) | |
| | **Total** | **37(100)** | **76(100)** | **113(100)** | |
| Protein (19g-46g) | Below RDA | 1(2.7) | 3(3.9) | 4(3.5) | **.621** ***(.872)*** |
| | Within RDA | 3(8.1) | 4(5.3) | 7(6.2) | |
| | Above RDA | 33(89.2) | 69(90.8) | 102(90.3) | |
| | **Total** | **37(100)** | **76(100)** | **113(100)** | |
| Iron (12.6-65.4mg) | Below RNI (5% bio.) | 15(40.5) | 23(30.3) | 38(33.6) | **6.491 (*.235)*** |
| | Within RNI (5% bio.) | 6(16.2) | 11(14.5) | 17(15.0) | |
| | Above RNI (5% bio.) | 7(18.9) | 16(21.1) | 23(20.4) | |
| | Below RNI (10% bio.) | 3(8.1) | 1(1.3) | 4(3.5) | |
| | Within RNI (10% bio.) | | 3(3.9) | 3(2.7) | |
| | Above RNI (10% bio.) | 6(16.2) | 22(28.9) | 28(24.8) | |
| | **Total** | **37(100)** | **76(100)** | **113(100)** | |
| Calcium (600-1300mg) | Below RNI | 32(86.5) | 63(82.9) | 95(84.1) | **.790** ***(.691)*** |
| | Within RNI | 2(5.4) | 3(3.9) | 5(4.4) | |
| | Above RNI | 3(8.1) | 10(13.2) | 13(11.5) | |
| | **Total** | **37(100)** | **76(100)** | **113(100)** | |
| Zinc (9.6-17.1mg) | Below RNI (low bio.) | 13(35.1) | 25(32.9) | 38(33.6) | **3.534** ***(.766)*** |
| | Within RNI (low bio.) | 3(8.1) | 5(6.6) | 8(7.1) | |
| | Above RNI (low bio.) | 9(24.3) | 11(14.5) | 20(17.7) | |
| | Below RNI (moderate bio.) | 2(5.4) | 4(5.3) | 6(5.3) | |
| | Within RNI (moderate bio.) | | 3(3.9) | 3(2.7) | |
| | Above RNI (moderate bio.) | 9(24.3) | 23(30.3) | 32(28.3) | |
| | Above RNI (high bio.) | 1(2.7) | 5(6.6) | 6(5.3) | |
| | **Total** | **37(100)** | **76(100)** | **113(100)** | |
| Vitamin A (450-600mcg) | Below RNI | 25(67.6) | 39(51.3) | 64(56.6) | **3.781** ***(.150)*** |
| | Within RNI | 2(5.4) | 13(17.1) | 15(13.3) | |
| | Above RNI | 10(27.0) | 24(31.6) | 34(30.1) | |
| | **Total** | **37(100)** | **76(100)** | **113(100)** | |

***Values were not statistically significant at p < .0.05 (Fisher's Exact test)** **n=Frequency, %=Percentages**

Result in Table 1 showed there was no significant (*p.>0.05*) difference in the daily energy, and nutrients intake of SAC in both schools. About half (50.4%) of the SAC have their daily energy intake within EER for age and gender in both schools. About 66.4% of the SAC in both schools had a daily iron intake within and above 5% and 10% bioavailability recommended for developing countries.

**CONCLUSION AND RECOMMENDATION(S):**

The DDS of SAC in both schools was optimal as majority consumed diverse diets. Also, SAC in both schools had a considerable daily intake of iron and zinc which are critical micronutrients required for adequate brain growth and cognition. This intake could be attributed to the high intake of meat, poultry, fish and seafoods which are good sources of iron and zinc in the last 24-hours. However, there was low intake of calcium among the SAC in both schools which is quite worrisome. Based on these findings, nutrition education programmes should be strengthened to increase awareness on the importance of adequate calcium intake for optimal bone mineralization and skeletal growth during childhood.

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**Sub-theme:** Precision Nutrition and Nutrients: Making the Promise a Reality

**Title**: Effects of Processing Methods on the Nutritional Quality and Microbial Safety of Fresh and Damaged Tomatoes for Precision Nutrition

**Names of Authors:** *Ani, O.N[1], Akpata, E.I[1], and Ezenwa, V.C[1]

**Affiliations of Authors**: [1]Department of Applied Biochemistry, Enugu State University of Science and Technology, Agbani, Enugu.

*nnenna.ani@esut.edu.ng, 08037782410.

**Keywords**: Tomato Processing, Nutritional Quality, Microbial Safety, Precision Nutrition

**Highlight:**

- Processing created distinct nutritional profiles in fresh and damaged tomatoes.
- Boiling preserved nutrients better than frying in fresh tomatoes
- Frying achieved the greatest reduction in microbial contamination

**BACKGROUND AND OBJECTIVES**: Tomato (*Solanum lycopersicum*) is a widely consumed vegetable and an important source of essential nutrients and bioactive compounds associated with a reduced risk of chronic diseases [1]. In Nigeria, tomatoes are dietary staples; however, significant postharvest losses resulting from poor handling and storage have led to the widespread sale of damaged or overripe tomatoes, particularly among low-income populations because of their affordability [3]. Although their consumption helps reduce food waste and improve food access, concerns remain regarding their nutritional quality and microbial safety. Household processing methods such as boiling and frying can alter nutrient retention and microbial load, thereby influencing the nutritional value and safety of the final product [4]. Despite their widespread consumption, there is limited information on how these processing methods affect the nutritional quality and microbial safety of these tomatoes. This study seeks to bridge this knowledge gap and compares the effects of boiling and frying on the proximate composition, vitamin and mineral contents, and microbial load of tomatoes commonly sold in markets to provide evidence that supports food-based precision nutrition strategies in resource-limited settings.

**MATERIALS AND METHODS**:

Fresh and damaged tomatoes were purchased from local markets, homogenized and subjected to boiling and frying treatments under standardized conditions. Proximate parameters and Vitamins were determined following the standard procedures of AOAC [4] while Minerals were quantified

using an Agilent FS240AA Atomic Absorption Spectrophotometer (AAS) following APHA [5] procedures. Data were analyzed using one-way ANOVA followed by Tukey's HSD post hoc test in IBM SPSS version 25. Statistical significance was set at $p < 0.05$.

**RESULTS AND DISCUSSIONS**: Processing significantly altered the nutritional and microbiological profile of the tomatoes, generating distinct functional outcomes. Boiled fresh tomatoes showed significantly higher ($p<0.05$) protein (19.54%), fiber (18.19%), ash (21.10%), and bioactive nutrients particularly vitamin A (0.58 mg/100g) and vitamin C (13.00 mg/100g). Frying significantly increased lipid content, with fried damaged tomatoes recording the highest lipid (13.66%) but no significant reductions ($p<0.05$) in vitamin retention. The mineral composition varied with the processing type, with boiled fresh tomatoes showing higher levels of calcium (17.019ppm), potassium (12.327ppm), and sodium (14.010ppm), while fried damaged tomatoes demonstrated increased iron (1.0311ppm) and zinc (0.5984ppm). Boiled damaged tomatoes recorded the highest total aerobic count ($4.0 \times 10^6$ cfu/g), total yeast, and mold count ($1.0 \times 10^6$ cfu/g), while fried fresh tomatoes showed the lowest microbial counts. Coliforms and Salmonella were absent in all samples, indicating acceptable hygienic quality. Staphylococcus species were detected only in boiled damaged tomatoes ($8 \times 10^5$ cfu/g) and fresh tomatoes ($6 \times 10^5$ cfu/g), suggesting possible post-processing contamination or survival of heat-tolerant organisms in boiled samples.

**CONCLUSION AND RECOMMENDATION**: Boiling preserved nutrients, while frying improved microbial safety and shelf stability. These processing-dependent differences support food-based precision nutrition and functional food strategies to enhance tomato utilization in low-income populations. Public health education is therefore recommended to encourage safe processing and utilization of damaged tomatoes among low-income populations.

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**SUB THEME 5: Precision Nutrition and Nutrients: Making the Promise a Reality**

**Title: Prevalence of Iodine Deficiency Among Adults (40yrs-70yrs) In Umuahia North LGA of Abia State.**

AUTHOR NAMES: *Adeoye-Agomoh, Q.C.[1], Anujem, E[1], Ezenwa, H.C.[1], Iwegbulem, C.C.[2], Okiyi, C.E.[1], Nwachukwu, D.[1], Okudu, H.O.[1] and Nzeagwu, O.C.[1].

CORRESPONDING AUTHOR EMAIL: adeoye-agomoh.queen@mouau.edu.ng

AFILLIATIONS:

*1. Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture Umudike, Abia State, Nigeria*

*2. Pediatrics Department, Federal Medical Centre, Umuahia, Abia State, Nigeria.*

**BACKGROUND AND OBJECTİVES:**

Globally, iodine deficiency remains a major public health concern. According to the World Health Organization (WHO), over two billion people are at risk of iodine deficiency, with approximately 30% of the world's population living in areas with iodine-deficient soils [1,2]. In Umuahia North LGA, Abia State, empirical data on adult iodine status remain scarce. This study assessed the prevalence of iodine deficiency among adults (40-70 yrs) in Umuahia North LGA.

**MATERIALS AND METHOD:**

A cross-sectional study using multistage and stratified sampling was conducted among 333 adults (40–70 years) in Umuahia North LGA, Abia State. Six communities were randomly selected across two major clans (Ibekwu and Ohuhu). Data were collected via structured, pilot-tested questionnaires, clinical goitre assessment (WHO classification), and urinary iodine concentration (UIC) salt iodine content (iodometric titration). Data were analyzed using SPSS version 25, Chi-square tests applied at a 0.05 significance level.

**RESULTS AND DISCUSSION:**

Goitre prevalence was low, with 95.2% of participants classified as Grade 0. Only 34 (10.2%) of salt and urine samples were analysed. Among these, 88.2% had moderate UIC (20–49 µg/L), 8.8% severe, and 2.9% mild, with no significant community variation (p=0.776). For salt iodine status, 58.8% were adequately iodized, 29.4% excessively iodized, and 11.8% inadequately iodized (p=0.373). Significant positive correlations were found between low educational level (r=0.451, p=0.001) and below-minimum-wage income (r=0.703, p=0.001) with UIC, while knowledge and attitude scores showed no significant associations with iodine status.

**Table 1: URINARY IODINE CONCENTRATION (UIC) AND SALT IODINE CONTENT (MG/KG) STATUS OF SELECTED ADULTS IN UMUAHIA NORTH LOCAL GOVERNMENT AREA OF ABIA STATE**

| Variable | Ndume | | Ossah | | Amuzukwu | | Umuawa | | Umuda | | Afugiri | | Total | | $X^2$ | P-Value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | F | % | F | % | F | % | F | % | | |
| **Urine Iodine Concentration Status** | | | | | | | | | | | | | | | | |
| Moderate deficiency (20-49 µg/L) | 6 | 17.6 | 3 | 8.8 | 5 | 14.7 | 6 | 17.6 | 5 | 14.7 | 5 | 14.7 | 30 | 88.2 | **6.449** | **0.776** |
| Severe deficiency (<20 µg/L) | 1 | 2.9 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2.9 | 1 | 2.9 | 3 | 8.8 | | |
| Mild deficiency (50-99 µg/L) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2.9 | 0 | 0 | 1 | 2.9 | | |
| **Total** | **7** | **20.6** | **3** | **8.8** | **5** | **14.7** | **6** | **17.6** | **7** | **20.6** | **6** | **17.6** | **34** | **100** | | |
| **Salt Iodine Status** | | | | | | | | | | | | | | | | |
| Adequately Iodized (15-40 ppm) | 3 | 8.8 | 2 | 5.9 | 3 | 8.8 | 5 | 14.7 | 4 | 11.8 | 3 | 8.8 | 20 | 58.8 | **10.779** | **0.373** |
| Excessively Iodized (>40 ppm) | 4 | 11.8 | 1 | 2.9 | 2 | 5.9 | 1 | 2.9 | 1 | 2.9 | 1 | 2.9 | 10 | 29.4 | | |
| Inadequately Iodized (0.1-14.9 ppm) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 5.9 | 2 | 5.9 | 4 | 11.8 | | |
| **Total** | **7** | **20.6** | **3** | **8.8** | **5** | **14.7** | **6** | **17.6** | **7** | **20.6** | **6** | **17.6** | **34** | **100** | | |

## CONCLUSION AND RECOMMENDATİON(S)

Clinical assessment showed a low prevalence of visible goitre. Laboratory analysis of urinary iodine concentration revealed that iodine deficiency remains a significant public health concern among adults in the study area.

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**Sub-theme: Precision Nutrition and Nutrients: Making the Promise a Reality**

# Development and adaptation of food consumption for nutritional research in Nigeria: A review

**Lama C. M[1], Makanjuola D.[2], Oche P. I. [2], Paul-E. J.[2], Anigo K. M.[3]**

[1]Department of Nutrition and Dietetics, Plateau State college of Health technology Zawan.

[2]Department of Nutrition and Dietetics, Nasarawa State University, Keffi, Nasarawa State.

[2]Department of Biochemistry, University of Abuja, Gwagwalada, Abuja.

***Corresponding Author: christykataiko@gmail.com; +2348036405357**

**Key Words:**

- Dietary assessment accuracy depends on the dietary assessment methods and tools used.
- Food composition data bases is used as a determinant of disease globally, although with large regional differences.
- Data on the composition of foods intended for human consumption is an important resource for different applications.

**Background and Objective:** The accuracy of the dietary assessment depends on the dietary assessment methods and tools used which are prone to measurement errors if not carefully and objectively selected. The development and adaptation of food composition databases (FCDBs) in Nigeria have evolved from utilizing international databases to creating tailored, country-specific datasets to improve the accuracy of nutritional research [1].

**Methodology**

Developing and adapting food consumption research in Nigeria focuses on combining national household surveys, local food composition databases, and adapted dietary assessment tools to account for regional staples, mixed-dishes, and ongoing nutrition transitions [2]. Database Integration by mapping food entries using regional references like the West Africa Food Composition Table and Nigerian Food Composition Tables.

**Conclusions**

Connections between FCDBs can complement information about a certain food or about region-specific indigenous food sources for a certain nutrient. However, establishing these connections will be made much easier by making more efforts to standardize and harmonize data (including FCDBs) across countries and regions in Africa including Nigeria.

**Recommendations**

To ensure the continuous compilation of food composition databases in Africa, it is necessary to focus on capacity building. This involves developing the skills and knowledge required to drive innovation and adhere to international standards and guidelines for managing food composition data.

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**Theme/sub-theme:** Precision Nutrition and Nutrients: Making the Promise a Reality

**Title:** Sensory Evaluation and Nutrient Composition of Biscuit Produced from Composite flour of Yellow maize (*Zea mays*) and Coconut (*Cocos nucifera*)

**Name of Author (s):** Akuirene, J. O. [1, 2,*], Itam, V. E. [1], Ibe, M. O.[1], Johnny, J. O.[1], Mkpat, J. F.E.[1], Ene-Obong, H. N.[1], Campbell, K. [2], Williams, I. O.[1]

*[1]Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences,College of Medical Sciences, University of Calabar, Calabar, Nigeria.; [2]Institute for Global Food Security (IGFS), School of Biological Sciences, Queen's University Belfast, UK BT95DL*

* **Correspondence Author:** Name: Joseph Odolomarun Akuirene; Correspondence Email Address: joakus7@unical.edu.ng

**Keywords:** *Yellow maize; coconut; biscuit; proximate composition;*

**Highlights:**

- The composite flour blends significantly improved the nutritional profile of the biscuits compared to the 100% wheat flour control.
- Biscuits from the composite flours had higher and variable moisture, ash, crude protein, fat, and fibre contents, with 60% yellow corn flour + 40% coconut flour recording the highest mineral content, while the 20% yellow corn flour + 80% coconut flour showing the highest vitamin content.
- The composite biscuits recorded high comparable scores to the control, which indicates general acceptability of the composite biscuits.

**Background and Objectives:** Consumption of biscuits, other unleavened and leavened products made from wheat flour (a ready-to-eat food and snacks products) has increased over the years in Nigeria and other developing countries, with unfavourable burden of wheat importation and heavy financial pressure on foreign exchange reserves in countries like Nigeria [1, 2]. The aim of this work is to find a relative readily available and sustainable substitute for wheat flour in biscuits, other unleavened and leavened products [2].

**Materials and Method**: This study employed an experimental design. The raw materials were purchased, identified, and processed into flour. The matured coconuts were cracked, meat separated, thoroughly washed, wet-blend and sieved, residue oven dried, and milled into flour. While the yellow maize grains were sorted, dehulled and allowed to ferment for 48 hours before drying and milling into flour. Yellow maize flour and coconut flour were blended in ratios of 50:50, 60:40, 80:20, and 20:80, while biscuits made from 100% all-purpose wheat flour served as the control. The nutrient composition of the biscuits was determined using standard AOAC-approved methods, whereas mineral and vitamin contents were analysed by ICP-MS and HPLC,

respectively. Sensory properties were evaluated by 20 semi-trained panellists using a nine-point hedonic scale. The data generated were analysed using SPSS version 26.

**Results and Discussion:** The composite-flour biscuits had significantly ($p < 0.05$) higher ranges of moisture (5.83 ± 0.01– 6.57 ± 0.02 g/100 g), ash (1.62 ± 0.01–1.75 ± 0.00 g/100 g), crude protein (8.94 ± 0.01–9.85 ± 0.03 g/100 g), total fat (14.67 ± 0.02–17.71 ± 0.01 g/100 g), and dietary fibre (1.31 ± 0.01–1.47 ± 0.01 g/100 g) than the 100% wheat flour biscuit. Among the blends, sample 103 (60% yellow maize flour and 40% coconut flour) recorded the highest overall mineral content, particularly for sodium, potassium, phosphorus, magnesium, and calcium. Sensory evaluation showed no significant differences ($p > 0.05$) among the biscuit samples in aroma, colour, taste, texture, or general acceptability. All formulations received high mean scores ranging from 7.47 to 8.33 on the nine-point hedonic scale. The results shows variable content of proximate, vitamins and minerals across the various composite biscuits when compared with that from 100% wheat flour. Yellow maize–coconut composite flour contributes to improving the nutritional quality of baked products and supports food diversification and security in Nigeria and other developing countries [3, 4].

**Conclusion and Recommendation:** The developed biscuits demonstrated appreciable nutritional superiority, being rich in protein, fat, and dietary fibre. The composite biscuits may serve as a suitable option for individuals with gluten intolerance or sensitivity. The findings also demonstrated the acceptability of biscuits produced from yellow maize–coconut composite flour and indicate their potential to increase the intake of selected nutrients while supporting the use of locally available flour alternatives for biscuit production in Nigeria.

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**Theme/sub-theme:** Precision Nutrition and Nutrients: Making the Promise a Reality

**Title:** Comparative Analysis between the Expected and Actual Energy and Nutrients Content of Blenderized-Formulated Tube Feeds Administered in Lagos University Teaching Hospital, Lagos, Nigeria.

**Name of Author (s):** Akuirene, J. O.[1,2]*, Akuirene, T. J.[3], Chukwumere, A. C.[4], Uche-Madu, C. H.[1], Chimah, P. O[5], Fadupin, G. T[6].

*[1]Department of Human Nutrition and Dietetics, Faculty of Allied Medical Sciences, College of Medical Sciences, University of Calabar, Calabar, Nigeria.; [2]Institute for Global Food Security (IGFS), School of Biological Sciences, Queen's University Belfast, UK BT95DL*

*[3]Department of Food Sciences and Microbiology, Faculty of Sciences, National Open University, Calabar Centre, Calabar, Nigeria.; [4]Department of Dietetics, University of Calabar Teaching Hospital, Nigeria.; [5]Department of Dietetics, University of Lagos Teaching Hosspital, Idi-Araba, Lagos, Nigeria.; [6]Department of Human Nutrition and Dietetics, Faculty of Public Health, , University of Ibadan, Ibadan, Nigeria.*

***Corresponding author:** joakus7@unical.edu.ng or akus7jo@gmail.com

**Keywords:** *Blenderised-formulated tube feeds; actual nutrient content; expected nutrient content; energy*

**Highlights:**

- This study affirms the variability in the proximate, energy, and mineral content of the expected and actual amount of enteral feed administered to the patient.

**Background and Objectives:** Clinical malnutrition has serious and varied effects, including heightened vulnerability to infections, weakened immune systems, delayed wound healing, progressive muscle loss, extended hospital stays, higher rates of rehospitalization, higher healthcare expenses, and increased mortality risks [1]. These consequences can be address by timely and prompt enteral feed when the gastrointestinal tract is functional and accessible. However, disparities in the nutrient content of blenderised-formulated tube feeds (BFTFs) administered to hospitalised patients may partly determine health outcomes in clinical settings and its benefit [2]. This study aimed to determine the actual energy and nutrient contents of BFTFs administered to two paediatric patients in relation to the prescribed amounts.

**Materials and Method:** This cross-sectional analytical study examined enteral feeds administered to patients in the hospital. Two paediatric patients were randomly selected from seven patients scheduled to receive BFTFs on the following day. The actual nutritional prescription including energy, protein, fat, carbohydrate, and prescribed volume for both patients, were obtained from the hospital's Dietetics Department. Two aliquot samples of each BFTF prepared in the Dietetics Department kitchen were collected on two separate occasions from additional quantities prepared for sampling. The samples were analysed using Association of Official Analytical Chemists (AOAC) methods.

**Results and Discussion:** For Diet 1, the mean ± standard deviation values for the actual amounts served were 61.50 ± 1.05 g protein, 75.17 ± 4.67 g fat, and 112.17 ± 6.59 g carbohydrate, compared with expected values of 89.67 ± 4.18 g protein, 109.83 ± 1.17 g fat, and 163.50 ± 1.87 g carbohydrate. The corresponding mean deficits were 28.50 ± 4.64 g, 34.67 ± 3.72 g, and 51.33 ± 5.57 g, respectively. Significant differences were observed for most nutrients across the two collection days ($p < 0.05$). Across both diets, the volume-weighted actual composition was approximately 86.24 kcal, 4.01 g protein, 4.30 g fat, and 7.64 g carbohydrate per 100 mL. The analysed samples showed discrepancies between the actual and expected macronutrient and micronutrient contents of the BFTFs administered. This finding confirms earlier research work that revealed that the absence of a standardized recipe led to irregularities in the nutrient values of blenderized feeds produced.

**Conclusion and Recommendation:** This study demonstrates variability between the expected and actual energy and nutrient contents of BFTFs administered to paediatric patients. Because nutrient discrepancies may affect patient outcomes, it is recommended that a standardised recipes, precise ingredient measurement, controlled dilution, and periodic laboratory verification be carried out to improve consistency and nutritional adequacy.

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| | |
|---|---|
| **Sub-theme:** | Precision Nutrition and Nutrients: Making the Promise a Reality |
| **Title:** | Glucose-Lowering Effects of *Cinnamomum verum*, *Xylopia aethiopica*, and *Piper nigrum*: A Structured Narrative Review |
| **Name of Author:** | **Chukwunwogor, E.S.** |
| **Affiliation of Author:** | Department of Nutrition and Dietetics, University of Nigeria, Nsukka<br>e-mail: echukwunwogor@gmail.com<br>Phone number: +234-8167628240 |
| **Keywords:** | Blood glucose, *Cinnamomum verum*, *Xylopia aethiopica*, *Piper nigrum* |

**Highlights**

- *Cinnamon* verum showed the strongest clinical evidence for glycemic improvement.
- *Xylopia* and black pepper demonstrated promising preclinical effects.
- Human trials are needed to evaluate combined spice interventions.

## BACKGROUND AND OBJECTIVES

Diabetes mellitus is characterized by persistent disturbances in blood glucose regulation, creating a need for complementary approaches to glycemic management. Bioactive compounds present in culinary spices have attracted research interest because of their potential effects on glucose metabolism and related pathways. *Cinnamomum verum* [1], *Xylopia aethiopica* [2], and *Piper nigrum* [3] have each been investigated for their potential glucose-lowering effects, although the available evidence differs considerably in study design and strength. This review examined available evidence on the individual glucose-lowering effects of these three spices and identified gaps in the literature regarding their potential combined effects.

## MATERIALS AND METHODS

A structured narrative review was conducted using PubMed, Science Direct, and Google Scholar to identify studies published up to 2025 on the glucose-lowering effects of *Cinnamomum verum*, *Xylopia aethiopica*, and *Piper nigrum*. Eligible human, animal, and laboratory studies reporting glycemic outcomes were included, while review articles, editorials, conference abstracts, and non-English publications were excluded. Evidence was reviewed according to spice and study design.

## RESULTS AND DISCUSSION

Thirteen studies met the inclusion criteria (Table 1), comprising four human randomized controlled trials, seven animal studies, and two in vitro/in silico investigations. *Cinnamomum verum* [1] demonstrated the strongest clinical evidence for improving glycemic control, whereas *Xylopia aethiopica* [2] and *Piper nigrum* [3] showed promising glucose-lowering effects primarily in

preclinical studies [2,3]. None of the included studies investigated the combined glucose-lowering effects of Cinnamomum verum, Xylopia aethiopica, and Piper nigrum, highlighting an important gap in the current evidence base.

**Table 1: Summary of Evidence on the Glucose-Lowering Effects of *Cinnamomum verum*, *Xylopia aethiopica*, and *Piper nigrum***

| Spice | Evidence base | Key Findings |
|---|---|---|
| *Cinnamomum verum* | Human RCTs (n = 4) | Reduced HbA1c, fasting blood glucose, insulin resistance |
| *Xylopia aethiopica* | Animal (n = 4); in vitro/in silico (n = 1) | Reduced blood glucose, improved pancreatic β-cell function, antioxidant activity, and inhibited α-amylase/α-glucosidase. |
| *Piper nigrum* | Animal (n = 3); in vitro (n = 1) | Improved glucose tolerance, insulin sensitivity, antioxidant activity, pancreatic protection, and neuroprotection. |

## CONCLUSION AND RECOMMENDATION(S)

*Cinnamomum verum*, *Xylopia aethiopica*, and *Piper nigrum* show promising glucose-lowering effects. Clinical evidence [1] is strongest for *Cinnamomum verum*, whereas evidence for *Xylopia aethiopica* and *Piper nigrum* is largely preclinical [2,3]. The lack of studies on their combined effects highlights an important research gap and warrants future experimental and clinical studies.

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# SUB-THEME 6: ORAL

**Theme/Sub-theme: Innovations in Clinical Protocols and Aligning Evidence-Based Interventions with Health System Delivery**

**Title: Awareness, Knowledge and Utilization of Nutritional Therapy Among Patients with Attention Deficit Hyperactivity Disorder in Lagos State**

*Tubi-Nwangwu I[1], Adewale C.O[2]

[1]Department of Human Nutrition and Dietetics, Lead City University, Ibadan, Nigeria.

[1]Department of Public Health, Lead City University, Ibadan, Nigeria.

[2]Department of Human Nutrition and Dietetics, Bowen University, Iwo, Nigeria.

*Corresponding author: tubi.mary@lcu.edu.ng

**Keywords:** Attention Deficit Hyperactivity Disorder; Nutritional therapy; Nutrition knowledge; Nigeria

**Highlights**

- High awareness but low utilization of nutritional therapy among ADHD patients.
- Dietitian consultation was the strongest predictor of nutritional therapy use.
- Social media surpassed healthcare professionals as the main nutrition information source.

**Background and Objectives**

Attention Deficit Hyperactivity Disorder (ADHD) is a common neurodevelopmental disorder affecting cognitive function, behaviour and quality of life. Although pharmacological and behavioural therapies remain the primary treatment approaches, nutritional therapy has emerged as a complementary strategy for symptom management [1,2]. However, evidence on patients' awareness, knowledge and utilization of nutritional therapy in Nigeria is limited. This study assessed awareness, knowledge and utilization of nutritional therapy among patients with ADHD in Lagos State and identified factors associated with its utilization.

**Materials and Methods**

A cross-sectional study was conducted among 150 patients diagnosed with ADHD attending selected health facilities in Lagos State. Data were collected using a structured questionnaire assessing awareness, knowledge, utilization of nutritional therapy, information sources, caregiver support and previous dietitian consultation. Descriptive statistics was used to summarize the data, while Chi-square and binary logistic regression identified factors associated with nutritional therapy utilization.

Descriptive statistics was used to summarize the data. while Chi-square and binary logistic regression identified factors associated with nutritional therapy utilization. Statistical significance was set at $p < 0.05$.

**Results and Discussion**

Overall, 86.0% of respondents had adequate awareness of nutritional therapy and 77.3% demonstrated adequate overall knowledge. However, 66.0% had inadequate knowledge of micronutrients associated with ADHD. Although awareness was high, only 35.3% had ever used nutritional therapy and 24.0% were current users. Social media and the internet were the major sources of nutrition information (57.3%), whereas only 14.7% received information from dietitians. Dietary modification (25.3%) and omega-3 supplementation (22.0%) were the most used interventions, while 64.1% of users reported moderate or significant improvement.

Awareness ($\chi^2 = 20.84$, $p < 0.001$) and knowledge ($\chi^2 = 8.97$, $p = 0.003$) were significantly associated with nutritional therapy utilization. Logistic regression showed that adequate awareness (AOR = 3.14; 95% CI: 1.21–8.13), adequate knowledge (AOR = 3.56; 95% CI: 1.64–7.73), previous dietitian consultation (AOR = 4.92; 95% CI: 1.93–12.54), and high caregiver support (AOR = 2.02; 95% CI: 1.01–4.06) independently predicted utilization.

**Table 1. Awareness, Knowledge and Utilization of Nutritional Therapy (N=150)**

| Variable | n (%) |
|---|---|
| Adequate Awareness | 129(86.0) |
| Adequate overall knowledge | 116 (77.3) |
| Inadequate micronutrient knowledge | 99 (66.0) |
| Ever utilized nutritional therapy | 53 (35.3) |
| Current users | 36 (24.0) |
| Moderate/ significant perceived benefit among users | 34 (64.1) |

**Table 2. Predictors of Nutritional Therapy Utilization**

| Predictor | Adjusted OR (95%) Cl) | P-value |
|---|---|---|
| Adequate Awareness | 3.14 (1.21-8.13) | 0.018 |
| Adequate knowledge | 3.56 (1.64 -7.73) | 0.001 |
| Previous dietitian consultation | 4.92 (1.93 -12.54) | <0.001 |
| High caregiver support | 2.22 (1.01 – 4.06) | 0.047 |

## Conclusion

Despite high awareness and overall knowledge, utilization of nutritional therapy among patients with ADHD remained low. Previous consultation with a dietitian, adequate nutrition knowledge and caregiver support significantly increased utilization. Integrating registered dietitians into multidisciplinary ADHD care and strengthening evidence-based nutrition education may improve the adoption of nutritional therapy in ADHD management.

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**Theme/sub-theme:** Innovations in Clinical Nutrition Practice across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title**: Modulation of the Insulin-Leptin Signaling Axis and Nrf2 Antioxidant Pathway by Zinc and Vitamin C Co-administration in Obese Models.

**Authors**: Oniyide, A.A[1], Onuoha, A. M[2], Awonowo, D, O[1], Olaiya, E.O[3]
**Authors' Affiliation:** [1]Department of Physiology, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria.

[2] Department of Human Nutrition and Dietetics, Afe Babalola University.

[1]University of Ilorin, Ilorin, Nigeria

[3]Department of Medical Biochemistry, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria.

**Corresponding author:** miracleonuoha48@gmail.com +2349060659099.

***Keywords****:* Obesity, Zinc, Vitamin C, Nrf2 Pathway, Insulin-leptin axis. Oxidative Stress, Synergism.

**Highlights.**

- HFD-fed rats exhibited significant hyperleptinemia and insulin resistance, evidenced by elevated HOMA-IR and HOMA-B values, alongside a marked reduction in brain Nrf2 signalling ($p < 0.05$).
- Metabolic and endocrine health was assessed via HOMA-IR, HOMA-B, and plasma leptin levels.
- Co-administration of Zinc and Vitamin C ameliorates obesity-associated metabolic and endocrine disturbances

**Background:** Obesity is a complex metabolic and endocrine disorder characterised by disruption of the insulin-leptin signalling axis and chronic low-grade inflammation [1]. Central to its pathogenesis is oxidative stress, which suppresses the nuclear factor elytroid 2-related factor 2 (Nrf2) pathway, a critical regulator of antioxidant defences [2]. This study investigated the synergistic potential of zinc and vitamin C to modulate these molecular pathways in a rat model of high-fat diet (HFD)-induced obesity.

**Methods**: Forty-nine male Wistar rats were fed a 40% HFD for 12 weeks to induce obesity and subsequently treated for 28 days with Zinc (4 mg/kg) and/or Vitamin C (200 mg/kg). Metabolic

and endocrine health was assessed via HOMA-IR, HOMA-B, and plasma leptin levels. The antioxidant response was evaluated by quantifying brain Nrf2 expression, glutathione (GSH), and malondialdehyde (MDA). Interaction effects were determined using the Bliss independence method.

**Results:** HFD-fed rats exhibited significant hyperleptinaemia and insulin resistance, evidenced by elevated HOMA-IR and HOMA-B values, alongside a marked reduction in brain Nrf2 signalling ($p < 0.05$). Co-administration of zinc and vitamin C significantly reversed these derangements. Bliss independence analysis revealed a synergistic interaction in the modulation of plasma leptin, glucose homeostasis, and systemic Nrf2 levels. While the combination restored brain neurotransmitter homeostasis, Nrf2 up regulation specifically enhanced the expression of antioxidant proteins, resulting in significantly increased GSH and reduced MDA levels in neural tissues.

**Conclusion:** This study demonstrates that the co-administration of Zinc and Vitamin C ameliorates obesity-associated metabolic and endocrine disturbances by restoring and activating the Nrf2 antioxidant pathway. This synergistic nutritional intervention offers a promising therapeutic strategy for mitigating the oxidative and inflammatory complications of obesity.

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**Theme/Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle. Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Health Seeking Behavior and Metabolic Risk Factors Among Staff of University of Nigeria, Nsukka, Enugu State

**Name of Authors:** *C.O. Anoshirike., A.R. Ndubuka., S.S. Ezeh., C.C. Adama., U.H. Ogbu., F.C. Asadu., F.I. Odoh., N.N. Ezema., M.C. Ezea., E.N. Michael., M.O. Donatus., & K.M. Anoshirike.,

**Affiliation of Authors:** Department of Nutrition and Dietetics, University of Nigeria Nsukka
***Corresponding Author's Email:** cyrilano4real@gmail.com Phone Number: +2348038673023

**Keywords:** Health-Seeking, Risk Factors, Metabolic Syndrome, University Staff

**Highlights:**
- High prevalence of metabolic risk factors and metabolic syndrome disease among staff of the university.
- Better health-seeking behaviour among University staff, influenced by severity of the ill health, cost and availability of health care services.

**BACKGROUND AND OBJECTIVES:** Metabolic risk factors are key physiological changes that directly increase the risk of non-communicable diseases (NCDs) like cardiovascular disease, diabetes, and cancers. These are responsible for significant morbidity, disability and mortality in Nigeria. Staff of the Universities often face a high burden of non-communicable diseases largely driven by behavioral risks, including unhealthy diets, physical inactivity, tobacco, high psychosocial stress, and often poor health-seeking behaviors. While they may have better health knowledge than the general population, this does not always translate into better health practices. Paucity of evidence-based research findings to drive policy action, has necessitated this study, which isto assess the association between health seeking behavior and metabolic risk factors among staff of University of Nigeria, Nsukka, Enugu State.

**MATERIALS AND METHOD:** A cross-sectional study involving 182 staff of the University of Nigeria Nsukka selected through a multi-stage sampling technique. Data were collected using validated structured questionnaire, anthropometric measurement, blood pressure measurement, biochemical test (Fasting blood glucose, and lipid profile test) using a standard protocol for metabolic syndrome classification according to International Diabetes Federation (IDF) (1). Data obtained were coded and analysed using computer programme IBM-Statistical Product and Service Solution (SPSS) for windows version 23. Statistical analysis was carried out using, chi-square test to ascertain the relationship between variables. Statistical significance was accepted at $p \leq 0.05$.

**RESULTS AND DISCUSSION:** More than half (64.1%) of the staff were male, 64.7% were aged 40-59 years, 76.0% were married. A higher proportion of male, married, aged 40-59 university staff in Nigeria suggests a mature, stable, but potentially patriarchal workforce with low turnover. Factors that trigger turnover intentions include aspects of work, job satisfaction, work stress, age,

education level, work culture, work pressure, workload, marital status, and job insecurity [2]. Approximately, half (50.8%) of the staff earned a monthly income of ₦151,000- ₦250,000, indicating that University staff earned relatively higher income bracket compared to the general population, though it is still subject to the country's high cost of living [3]. More than one third (44.9%) of the staff had abdominal obesity, 42.1% and 25.8% were diagnosed of overweight and obesity, respectively. More than half (51.7%) of the staff had elevated blood pressure, 29.5% had an elevated fasting blood glucose, 21.6% were diagnosed with metabolic syndrome. There was a high prevalence of metabolic risk factors and metabolic syndrome disease among university staff. Seven out of every ten staff had been sick in the past 6 months, 31.4% seek health care service when they are sick from private hospital/clinics, 71.4% had ill-health as the reason for seeking health care services, 58.0%, 48.0% and 46.0% reported perceived seriousness of illness, availability of health care services and cost of care, respectively as factors influencing health care seeking decisions. Over 70% of staff of the University used the private hospital or clinic as the first source of treatment. This is considerably higher than has been found in other studies [4,5]. This is further indication of better health-seeking behaviour among University staff than the general population. However, It is influenced by seriousness of the sickness, cost of care and health care service availability to the staff.

**CONCLUSION AND RECOMMENDATIONS:** The study observed good health-seeking behaviour and high prevalence of metabolic risk factors and metabolic syndrome disease among staff of the university. This calls for urgent work-based interventions targeting University Staff on dietary modification, weight management and nutrition education to reduce the burden of the diseases and prevent worsening health condition.

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**Theme/sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

# A LOW-GLYCEMIC ALTERNATIVE FOR CLINICAL NUTRITION: THE POTENTIAL OF GERMINATED PIGEON PEA AND COCOYAM COOKIES FOR POSTPRANDIAL GLYCEMIC CONTROL

**Ajayi J.O.[1], Omolade O.E.[2], Ogunkunle M.[1], Ekundare O.K.[3], Oyewo, I.O.[2].**

[1]Department of Human Nutrition and Dietetics, University of Ibadan, Oyo State.

[2]Department of Human Nutrition and Dietetics, University of Ilesa, Ilesa, Osun State.

[3]Department of Food Science and Nutrition, Landmark University, Omu-Aran, Kwara State.

*Corresponding author, e-mail: omoniyi_omolade@unilesa.edu.ng, +2347038837575.

**KEYWORDS:** Diabetes; Composite; Glycemic; postprandial.

**HIGHLIGHTS**

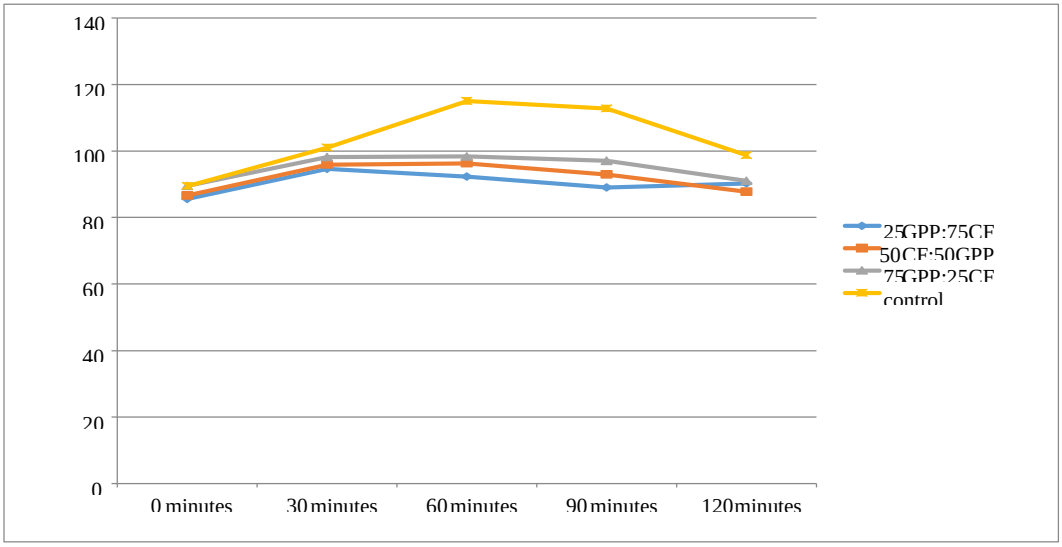
- Composite cookies showed significantly lower glycemic response vs glucose.
- Lowest GI (16.22) recorded in 25% GPPF and 75% cocoyam formulation
- The findings support therapeutic dietary control for diabetes across various life stages.

**BACKGROUND AND OBJECTIVES:** The growing prevalence of diabetes in low and middle income countries has increased the need for affordable dietary strategies for glycemic control [1]. Functional foods with low glycemic impact are increasingly relevant due to the health risks associated with refined, energy dense diets [2]. Although composite flours from local crops offer nutritional benefits, evidence on their glycemic effects remains limited. This study evaluated the glycemic index and postprandial glucose response of cookies produced from germinated pigeon pea and cocoyam flours for clinical nutrition management.

**MATERIALS AND METHOD:** An experimental design was used to assess glycemic index and postprandial response of cookies formulated from germinated pigeon pea and cocoyam composite flours. Apparently healthy adults aged 18–35 years participated. Wheat cookies served as control. Blood glucose was measured at fasting and over 120 minutes following consumption of portions containing 50 g available carbohydrate using the Brouns protocol. Data were analyzed using SPSS version 20.0.

**RESULTS AND DISCUSSION:** All composite cookies produced significantly lower postprandial blood glucose responses compared with the glucose reference ($p < 0.05$). Blood glucose increased mildly at 30–60 minutes before returning toward baseline at 120 minutes. Glycemic index ranged from 16.22 to 46.77, with all samples classified as low glycemic index and low glycemic load. The 25% germinated pigeon pea and 75% cocoyam formulation recorded the lowest GI, while the wheat control showed the highest values. The reduced glycemic response may be linked to the fibre, protein, and resistant starch content of germinated pigeon pea, alongside the carbohydrate slowing properties of cocoyam [3]. Similar findings have been reported for pulse based products used in glycemic management [4].

**Fig 1: Graph for the glycemic response of all the test foods and the control**




**CONCLUSION AND RECOMMENDATION(S):** Germinated pigeon pea and cocoyam composite cookies demonstrated low glycemic responses and improved postprandial glucose control. These findings support their potential use in clinical dietary management of diabetes. Increased utilization of locally available composite flours may improve glycemic management while supporting food security and local agriculture.

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**Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Effect of After-Meal Consumption of Soft Drinks on the Glycemic Index and Glycemic Load of fried rice.

**Name of Authors:** Salawudeen, S. O.[*1], Sadiq, L. O. [1], Abdullahi, N. M. [2], Abdulaziz, B. O. [1] and Jimoh, F. O.[1].

**Affiliation of Authors:** [1]Department of Biochemistry, Confluence University of Science and Technology, Osara, Kogi State

[2]Department of Biological Sciences, Confluence University of Science and Technology, Osara, Kogi state

*Corresponding author's email: ssomeiza1990@gmail.com, +2347066605406

**Keywords:** Glycemic load, glycemic index, after-meal consumption and fried rice

**Highlights:**

- This study shows that the glycemic index of fried rice rises when followed by soft drink ingestion, while the glycemic load is markedly higher, indicating a greater overall glucose burden.
- Over time, this could predispose individuals to obesity, insulin resistance, and type 2 diabetes.

**BACKGROUND AND OBJECTIVES:**

The frequent pairing of starch-based meals with sugar-sweetened beverages is a widespread dietary habit that may adversely affect postprandial glucose dynamics. This study aimed to investigate how the intake of soft drinks immediately following a fried rice meal influences the Glycemic Index (GI) and Glycemic Load (GL), providing insights into the potential metabolic risks of this dietary pattern.

**MATERIALS AND METHODS:**

A controlled experimental approach was employed in which each of the participants served as their own control. Seventeen participants who satisfied the inclusion criteria and voluntarily consent to participate in this research were recruited. The participants were served standard glucose solution used as standard for the calculation of GI just after their fasting Blood Sugar (FBS) have been taken. They were then served standardized portions of fried rice alone after interval of some days. Fried rice followed by a commercially available soft drink was also served to the participants after

intervals of some days. Capillary blood glucose concentrations were measured at baseline (FBS) and at regular intervals of 30 minutes post-consumption. The values obtained were used to calculate both GI and GL.

## RESULTS AND DISCUSSION

Findings revealed that the intake of soft drinks after fried rice significantly increased the GI and GL from 62.88 ± 26.24% and 31.35 ± 13.13% to 101.00 ± 41.26% and 50.53 ± 20.70% respectively ($p < 0.0001$).

**Table 1:** Showing the result of paired sample T test of the glycemic indices of the fried rice consumed with water compared to the fried rice consumed with soft drink.

| Meal combination | GI (%) | P value |
|---|---|---|
| Fried rice with water | 62.88 ± 26.24 | 0.0001 |
| Fried rice with soft drink | 101.00 ± 41.26 | |

Value = mean ± Standard deviation. (n = 17)

**Table 2:** Showing the result of paired sample T test of the glycemic Load of the fried rice consumed with water compared to the fried rice consumed with soft drink.

| Meal combination | GL | P value |
|---|---|---|
| Fried rice with water | 31.35 ± 13.13 | 0.0001 |
| Fried rice with soft drink | 50.53 ± 20.7 | |

Value = mean ± Standard deviation (n = 17)

The combination of fried rice and soft drinks induces a rapid and prolonged increase in blood glucose, which carries significant metabolic consequences [1]. Frequent postprandial hyperglycemia, even in those without pre-existing conditions, is linked to heightened oxidative stress, systemic inflammation, and the onset of insulin resistance [2]. These physiological impairments are established precursors to chronic metabolic disorders, such as cardiovascular disease and type 2 diabetes [3].

## CONCLUSION AND RECOMMENDATION

This study highlights the metabolic dangers of pairing sugar-sweetened beverages with high-carbohydrate meals, as evidenced by elevated glycemic responses that heighten long-term disease risk. These findings necessitate targeted public health initiatives and dietary education to discourage habitual intake of high-glycemic combinations for improved metabolic stability.

Implementing such interventions is crucial to mitigating chronic health issues associated with poor glycemic regulation in frequent consumers.

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**Sub-theme:** Innovation in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

# Iron Statusand Dietary Habit of School-age Children in Selected Primary Schools in Afikpo, Ebonyi State, Nigeria

AGWO, Emmanuel Onya
Department of Hospitality Management and Tourism, AkanuIbiam Federal Polytechnic Unwana, Ebonyi. eoagwo@akanuibiampoly.edu.ng ; +2347030201747

**Keywords**: Anaemia, Malnutrition, School-age, Haemoglobin

**Highlights**

1. Most school-age children skipped meal (breakfast)
2. One-quarter of the children had anaemia
3. Dietary habit was associated with anaemia

## BACKGROUND AND OBJECTIVES

Anaemia a micronutrient deficiency has a range of adverse consequences including; poor cognitive performance, poor growth of infants, preschool and school-aged children; impairment of physical capacity and work performance of adolescents and adults; reduction in immune competence; and increased morbidity from infections in all age groups (1). This study explored association between biomaker of iron status and socioeconomic characteristics/dietary habit. After extensive literature search, there is no information on iron status of primary school children within Afikpo town, it is therefore necessary to assess iron status and dietary habit of Primary School Children in Afikpo, Ebonyi state. Findings from this work will provide baseline information to reference for future studies while data from this study would serve as reference for advocacy in the future for Governmental intervention programmes.

## MATERIALS AND METHOD

This is a descriptive and cross-sectional study that involved 450 randomly selected primary schools pupils from four (4) schools in Afikpo town, Afikpo LGA. A structured questionnaire was used to obtain data on respondents' socio-economic and demographic characteristics, dietary habits. Blood samples from a sub-sample (70) of the selected children were analyzed for Heamoglobin (Hb) concentration using standard procedures. Data was computed into Excel and later exported to SPSS version 21. Consent was gotten from parents of children before collecting blood samples. Ethical clearance was obtained from Ebonyi State Ministry of Health, while approval to collect data was gotten from SUBEB and the Ministry of Education.

**RESULTS AND DISCUSSION**The mean age for male and female were 9.08±1.81 and 9.05±1.83years while mean haemoglobin concentration for male and female were 11.22±2.83 (g/dl) and 11.53±2.76 (g/dl) respectively with no significance (p>0.05) gender difference. Also 51.3% skipped breakfast daily while 68.0% had pallor. The prevalence of anaemia- normal, mild, moderate and severe was 45.7, 22.9, 24.3 and 7.1% respectively.

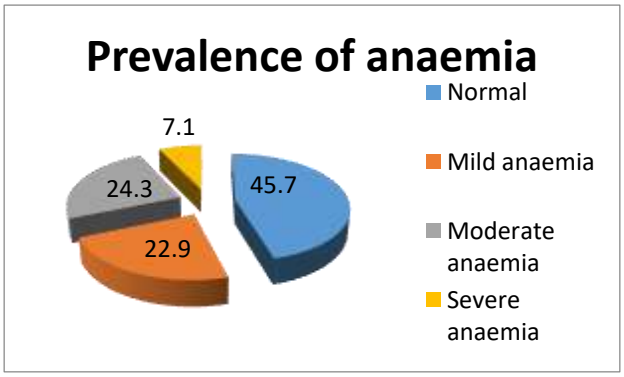



Fig. 1: Prevalence of anaemia

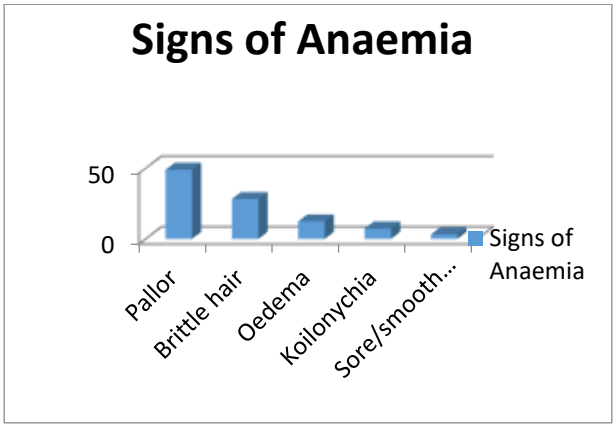



Fig 2. Signs of Anaemia

**Table 1: Iron status parameter of children according to gender (N=70)**

| Variables | Mean ± SD | | Cut-off values | p-value |
|---|---|---|---|---|
| | **Male (n=30)** | **Female (n=40)** | | |
| Hb (g/dl) | 11.22±2.83 | 11.53±2.76 | 11.5-13 | 0.652 |
| Age (years) | 9.08±1.81 | 9.05±1.83 | 6-12 | 0.884 |

Hb- Haemoglobin, p<0.05*

## CONCLUSSION AND RECOMMENDATION

In conclusion, there is prevalence of anaemia among school-age children in Afikpo town, this could be linked to low socio-economic (mothers' education & income) status among parents as majority are mostly farmers with low income. Nutrition education is necessary to enlighten both parents and school children.

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**Theme/Sub-theme:** Innovation in Clinical Nutrition Practice across the life cycle; Aligning Evidence –Based Protocols with Health System Delivery

**Title:** Effect of Nutritional Counselling and Dietary Intervention on Nutritional Status, Antioxidant Vitamins and Oxidative Stress Biomarkers among Tuberculosis Patients Attending Infectious Diseases Hospital Kano, Nigeria

***Salman, J.Y.**[1] and Gadanya, A.M.[2]

[1]Department of Human Nutrition and Dietetics, Faculty of Allied Health Sciences Northwest University Kano.

[2]Department of Biochemistry (Nutrition), Faculty of Basic Medical Sciences, Bayero University, Kano, Nigeria.

*Corresponding author, e-mail: jsalman@nwu.edu.ng, 07031611727

**Keywords:** Tuberculosis; Nutritional counselling; Fruit supplementation; Antioxidants

## HIGHLIGHTS

- Combined fruits intake improved serum zinc, vitamins A and C levels in TB patients.
- Dietary intervention enhanced antioxidant enzyme activity and total protein.
- TB patients demonstrated poor dietary diversity and low protein intake.

## BACKGROUND AND OBJECTIVES

Tuberculosis (TB) remains a major public health challenge in Nigeria, which is among the high TB burden countries globally (W.H.O., 2022) Despite the recognized interaction between nutrition and TB outcomes, nutritional support is not routinely integrated into TB management programs in many resource-limited settings and evidence on the impact of specific dietary interventions on the health outcomes during the anti-tuberculosis therapy (ATT) remains scarce. This study evaluated the effect of nutritional counselling and supplementation with locally available fruits on nutritional status, selected biochemical parameters, and antioxidant indices of TB patients attending Infectious Disease Hospital (IDH), Kano.

## MATERIALS AND METHODS

This randomized controlled intervention study was conducted among sixty consented TB patients undergoing the intensive phase of ATT at IDH Kano between June and July 2021. Participants were randomly allocated into six groups of ten: Group I (control, no intervention), Group II (nutritional counselling only), Group III (watermelon daily), Group IV (cucumber daily), Group V (orange daily), and Group VI (watermelon + cucumber + orange daily), in addition to their normal diet. Socio-demographic characteristics and dietary habits were assessed using structured questionnaires and FAO 24-hour dietary recall. Anthropometric parameters including Body Mass Index (BMI), body fat, muscle mass, resting metabolism, and visceral fat were assessed using a body composition monitor and stature meter.

Serum total protein, albumin, iron, zinc, vitamins A, C, and E were determined using UV-visible spectrophotometry, while serum superoxide dismutase (SOD), glutathione peroxidase (GPOx), and catalase (CAT) activities were analyzed using ELISA methods. Data obtained were analyzed statistically at $p<0.05$ significance level.

## RESULTS AND DISCUSSION

Participants were predominantly male (66.7%), aged 23–31 years (40%), of low socioeconomic status (83.3% earned <₦50,000/month). Dietary assessment revealed near-universal daily carbohydrate consumption (98.3%) particularly cereals, inadequate protein intake with legumes as the primary source (58.3%), and poor fruit and vegetable intake. No significant differences in anthropometric indices were observed across groups ($p>0.05$); however, Groups III and VI recorded higher BMI compared to Groups I, IV, and V (all BMI <18 kg/m²). Serum zinc was significantly elevated in Group VI relative to both Groups I and II ($p<0.05$). Catalase activity was significantly higher in Group VI compared to Groups I and II. Serum vitamin A was significantly greater in Group VI than in Groups I, II, IV, and V. Vitamin C was significantly elevated in Groups V and VI compared to the control and counselling-only groups ($p<0.05$). These findings are consistent with the documented antioxidant richness of the test fruits (Modupe & Aduradara, (2021) and with evidence linking vitamin C to bactericidal synergy with first-line ATT drugs (Vilchèze *et al*., 2018). Nutritional counselling alone produced no significant biochemical benefit, highlighting that access to actual food support—not advice alone—is critical in this population.

## CONCLUSION AND RECOMMENDATIONS

Supplementation with a combination of watermelon, cucumber, and orange during the intensive phase of ATT significantly improved serum zinc, total protein, vitamin A, vitamin C, and catalase activity in TB patients. The combined fruit intervention outperformed single-fruit groups and nutritional counselling alone, suggesting a synergistic antioxidant effect. It is recommended that TB management programs in Nigeria incorporate structured fruit supplementation as a low-cost, culturally acceptable adjunct to ATT. Policymakers should integrate nutritional support with food provision into national TB care guidelines.

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**THEME: DELIVERING BETTER NUTRITION FOR ALL: Converting the Dots Across life Cycle, Systems, Sectors**

**SUB-THEME: INNOVATIONS IN CLINICAL NUTRITION PRACTICE ACROSS THE LIFE CYCLE: ALIGNING EVIDENCE-BASED PROTOCOLS WITH HEALTH SYSTEM DELIVERY**

# Menopause knowledge and Nutrition Counseling Practices among Health Practitioners in Kaduna State, Nigeria: Strengthening Evidence-Based Menopausal Health Services.

AUTHOR(S): Aliyu, S.T., Aliyu M.L, & Umar, H.J.

AFFILIATION OF AUTHOR(S): Department of Nutrition and Dietetics, College of Science and Technology, Kaduna Polytechnic, Kaduna, Nigeria.

Corresponding Author: Aliyu, S.T.

Email: safiyaatnutrition@gmail.com Phone Number: +2348037033026

**KEYWORDS:** Menopause, Women's Health, Nutrition Education, Health Practitioners

## BACKGROUND AND OBJECTIVES

Menopause is a natural physiological process occurring mainly between ages 45 and 55, characterized by the cessation of menstruation and a decline in estrogen levels. This transition is associated with several health challenges such as osteoporosis, cardiovascular diseases, metabolic disorders, sleep disturbances, and weight gain(1). Nutrition education and dietary management have been identified as important approaches for reducing menopausal symptoms and improving women's quality of life (1,2). Health practitioners play a central role in providing nutrition counseling; however, evidence shows gaps in their knowledge and practice regarding menopause-related health risks (3,4). This study assessed the knowledge of menopause and nutrition education practices among health practitioners in Kaduna State, Nigeria.

## MATERIALS AND METHODS

A cross-sectional descriptive study design was used among health practitioners in selected government and private health facilities in Kaduna South Local Government Area. Participants were selected using a multistage sampling technique across primary, secondary, and tertiary health facilities. Data were collected using a structured electronic questionnaire distributed via WhatsApp and email. The instrument covered demographics, knowledge of menopause, and nutrition education practices. Data were analyzed using SPSS version 25 using descriptive statistics and Chi-square tests.

## RESULTS AND DISCUSSION

**Table 1: Knowledge of Menopause among Health Practitioners**

| Knowledge Variable | Yes, I know | | Not very sure | | No, I don't | |
|---|---|---|---|---|---|---|
| | F | % | F | % | F | % |
| Knowledge of menopause symptoms | 473 | 72.5 | 137 | 21.0 | 42 | 6.4 |
| Menopause increases cardiovascular disease risk | 276 | 42.3 | 88 | 13.5 | 218 | 44.1 |
| Menopause increases osteoporosis risk | 250 | 38.4 | 74 | 11.3 | 330 | 50.7 |
| Menopause increases breast cancer risk | 206 | 31.6 | 98 | 15.0 | 348 | 53.4 |

Findings revealed that 72.5% of health practitioners had basic knowledge of menopause symptoms, indicating generally good awareness. However, notable gaps existed in understanding menopause-related health risks, with only 42.3% aware of its link to cardiovascular diseases, 38.4% recognizing its association with osteoporosis, and 31.6% aware of its link to breast cancer. These knowledge deficiencies may limit practitioners' ability to provide effective nutrition education and counseling for menopausal women. The findings are consistent with previous studies reporting inadequate awareness of menopause-related chronic disease risks among healthcare providers (3,4). Additionally, professional specialization was significantly associated with knowledge of menopause ($\chi^2 = 16.70$, $p = 0.005$), with nutrition and reproductive health practitioners showing better understanding.

## CONCLUSION AND RECOMMENDATION(S)

In conclusion, although practitioners demonstrated moderate knowledge of menopause symptoms, important gaps remain in their understanding of associated health risks and nutrition counseling practices. The study recommends regular training and capacity-building on menopause management, integration of menopause nutrition counseling into continuing professional development, and the provision of standardized, evidence-based guidelines to improve women's health outcomes.

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**Sub-Theme: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.**

# Title: Effectiveness of a Community-Based Nutrition Education Intervention on Blood Pressure, Body Fat, Muscle Mass, and Visceral Fat among adults with High Blood Pressure in low-resource Communities

[1]Benneth I. C*, [2]Afam-Anene C.O, [3]Onyeji G. N, [1]Okoh I. C.

Department of Human Nutrition and Dietetics, Alex-Ekwueme Federal University, Ndufu-Alike, P.M.B. 1010, Abakaliki, Ebonyi State Nigeria.
[2]Department of Nutrition and Dietetics, Imo State University, P.M.B. 2000, Owerri, Imo State, Nigeria.
[3]Department of Human Nutrition and Dietetics David Umahi Federal University of Health Sciences, P.M.B. 211, Uburu, Ebonyi State Nigeria.

*Corresponding Author Details: Benneth I.C, ihuoma.benneth@funai.edu.ng , 07064799019.
**Keywords:** Hypertension, DASH Nutrition Education Intervention, Body fat

**Highlight**

- Nutrition education reduced body fat percentage and blood pressure levels of the participants.
- There was a significant positive correlation between body fat and both systolic and diastolic blood pressure.

## BACKGROUND AND OBJECTIVES

Hypertension is a key factor in cardiovascular diseases (CVD) and early death (1). Globally, around 1.39 billion adults have hypertension; of these, about 349 million live in high-income countries, while approximately 1.04 billion are in low- and middle-income regions (2).

## OBJECTIVE

This study aimed to examine the connection between body fat and blood pressure following nutrition education programs in two South-Eastern States of Nigeria.

## MATERIALS AND METHODS

The study included 720 adults aged 50-70 years with either systolic blood pressure (SBP)>140 mmHg or diastolic blood pressure (DBP)>90 mmHg. Conducted across two senatorial districts in southeastern Nigeria—Abia Central and Ebonyi South—the research used a formula from Frankfort-Nachmias and Nachmias (1992) to determine the minimum sample size for this cross–sectional study. Participants were selected via multi-stage sampling and were divided equally between the intervention (n=360) and control groups (n=360). The intervention group participated in a 16-week nutrition education program led by trained dietitians and nurses. Blood pressure was measured twice with a manual sphygmomanometer after at least 5 minutes of seated rest, and the average was recorded. Body fat was measured with a 50 kHz bioelectrical impedance analyzer, which also recorded weight and body fat percentage. Data analysis was performed using SPSS version 23.0.

Data were presented as frequencies and percentages. Quantitative data were presented in tables. Pearson product-moment correlation was used to assess relationships between variables. An independent t-test was used to compare means between the treatment and control groups.

## RESULTS AND DISCUSSION

### Blood Pressure Measurements of the Respondents at Baseline and Endline

The average baseline systolic blood pressure was 157.24 ± 14.22 mmHg in the intervention group, slightly higher than the control group's 156.9 ± 13.0 mmHg. By the study's end, the intervention group's mean blood pressure decreased to 153.74 ± 11.88 mmHg, while the control group's mean remained nearly the same at 155.72 ± 12.60 mmHg. Paired t-test results showed the reduction in the intervention group was statistically significant ($t = 3.562$, $p < 0.05$), whereas the control group experienced no significant change ($t = 0.560$, $p > 0.05$).

### Body Fat of the Respondents for Baseline and Endline

Initially, all groups had similar body fat percentages. By the study's end, notable differences in body fat composition emerged. The group that received nutritional education showed a marked decrease; to 24.1% ± 12.0. The paired t-test confirmed this reduction was statistically significant for the intervention group ($t = 3.623$, $p < 0.05$), whereas the control group's change was not statistically significant ($t = 0.456$, $p > 0.05$).

### Correlation between Body Fat and Blood Pressure

A strong, statistically significant positive correlation was observed between body fat and both systolic and diastolic blood pressure in both groups. In the treatment group, the correlation coefficients were $r = 0.644$ ($p < 0.05$) for systolic pressure and $r = 0.484$ ($p < 0.05$) for diastolic pressure. Meanwhile, the control group showed a slightly stronger correlation at the end line, with $r = 0.702$ ($p < 0.05$) for systolic and $r = 0.528$ ($p < 0.05$) for diastolic blood pressure.

**CONCLUSION AND RECOMMENDATION:** The study indicated body fat to be a determinant of both systolic and diastolic blood pressure

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**Theme/sub-theme**: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title**: Prevalence and Factors Associated with Hypocalcemia Among Pregnant Women in Jahun, Jigawa State, Nigeria

**Name of Authors**: *Nafisa, A.A.[1], Mudansir, M.[1], Abubakar, H.A.[1]

**Affiliation of Authors:** [1]Department of Biochemistry, Bayero University Kano

*Corresponding Author, Email: naadamu.bch@buk.edu.ng +2348039177454

**Keywords:** Hypocalcemia, Pregnancy, Calcium Deficiency

**Highlights:**

- Hypocalcemia was identified in 27.5% of pregnant women assessed biochemically.
- Younger maternal age, low educational attainment, and non-use of antenatal supplements were significantly associated with hypocalcemia.

**BACKGROUND AND OBJECTIVES**: Pregnancy is associated with increased nutritional demands required to support maternal health and foetal growth [1]. Calcium is particularly important for foetal skeletal development, neuromuscular function, blood coagulation, and cellular signaling [2]. The demand for calcium increases progressively throughout gestation, with approximately 25–30 grams of calcium transferred from the mother to the foetus by term, most of which occurs during the third trimester when foetal skeletal development is most rapid [3]. This study determined the prevalence of hypocalcemia and identified the associated socio-demographic and dietary predictors among pregnant women attending antenatal clinics at General Hospital Jahun, Jigawa State.

**MATERIALS AND METHODS:** A hospital-based cross-sectional study was conducted among 100 pregnant women aged 15–49 years attending antenatal clinic at General Hospital Jahun, Jigawa State, between October and November 2025. Participants were recruited via systematic random sampling. Data on socio-demographic details, obstetric history, health status, and nutritional knowledge were gathered using a pre-tested, structured, interviewer-administered questionnaire. Dietary intake patterns of calcium-rich foods were assessed via an adapted Food Frequency Questionnaire (FFQ). For biochemical profiling, a systematic sub-sample of 40 participants was selected. Venous blood samples (5 mL) were collected, and serum total calcium concentrations were determined using Atomic Absorption Spectrophotometry (AAS). Hypocalcemia was defined using a standard clinical threshold of serum calcium <8.5 mg/dL. Statistical analysis was carried out using IBM SPSS version 25.0. Categorical datasets were analyzed with Pearson's Chi-square and Fisher's exact tests, with statistical significance set at $p < 0.05$. Ethical approval was obtained from the Jigawa State Ministry of Health Research Ethics Committee (JGHREC/2025/240).

**RESULTS AND DISCUSSION:** The mean age of respondents was 26.4 ± 6.2 years. Nearly half (45.0%) had no formal education, while 68.0% reported monthly incomes below ₦10,000 (Table 1). Dietary assessment revealed low consumption of calcium-rich foods; only 7.0% consumed milk daily, whereas 47.0% rarely consumed fish with edible bones. Consumption of carbonated beverages was high (88.0%), potentially contributing to poor calcium status.

**Table 1: Socio-demographic Characteristics of Respondents (N = 100)**

| Variable | Category | n | % |
|---|---|---|---|
| **Age (years)** | <20 | 17 | 17.0 |
| | 20–24 | 28 | 28.0 |
| | 25–29 | 21 | 21.0 |
| | 30–34 | 26 | 26.0 |
| | ≥35 | 8 | 8.0 |
| **Education** | No formal education | 45 | 45.0 |
| | Primary education | 22 | 22.0 |
| | Secondary education | 22 | 22.0 |
| | Tertiary education | 11 | 11.0 |
| **Occupation** | Farmer | 2 | 2.0 |
| | Trader | 54 | 54.0 |
| | Civil servant | 7 | 7.0 |
| | Housewife | 23 | 23.0 |
| | Others | 14 | 14.0 |
| **Monthly income (₦)** | <10,000 | 68 | 68.0 |
| | 10,000–30,000 | 23 | 23.0 |
| | 30,000–50,000 | 1 | 1.0 |
| | >50,000 | 8 | 8.0 |

Values are presented as frequency (n) and percentage (%). Percentages may not total exactly 100 due to rounding.

**Table 2: Serum Calcium Status of Respondents (N = 40)**

| Serum Calcium Status | N | % | Mean ± SD (mg/dL) | Range (mg/dL) |
|---|---|---|---|---|
| Normal (≥8.5 mg/dL) | 29 | 72.5 | 9.40 ± 0.46 | 8.6–10.3 |
| Hypocalcemia (<8.5 mg/dL) | 11 | 27.5 | 8.15 ± 0.17 | 7.8–8.4 |
| **Total** | **40** | **100.0** | — | — |

Values are presented as frequency (n), percentage (%), mean ± standard deviation (SD), and range.

Biochemical assessment of the sub-sample revealed an overall hypocalcemia prevalence of 27.5% (11/40), with a mean serum calcium level of 8.15 ± 0.17 mg/dL within the deficient group (Table 2). This prevalence indicates that more than one in four pregnant women assessed had suboptimal calcium status and is comparable to reports from other low- and middle-income settings [4].

Hypocalcemia was significantly linked to younger maternal age (<20 years; $p < 0.001$), lack of formal education ($p < 0.001$), housewife status ($p < 0.001$), and low household income ($p < 0.001$). Nutritional and behavioral choices also strongly predicted deficiency status: non-use of antenatal supplements ($p = 0.0007$), eating meals outside the home ($p = 0.0067$), adherence to cultural food restrictions ($p = 0.0164$), and first-trimester gestational status ($p = 0.0092$) were all significantly

associated with low serum calcium levels. The lower prevalence among supplement users suggests that improved access to prenatal supplementation may contribute to better maternal calcium status.

**CONCLUSION AND RECOMMENDATIONS:** Hypocalcemia affects more than one in four pregnant women attending General Hospital Jahun, highlighting calcium deficiency as a hidden public health concern in this rural northern Nigerian population. The condition is heavily driven by poor maternal socioeconomic status, low dietary inclusion of dairy and animal-source calcium, and sub-optimal utilization of prenatal supplements. It is recommended that the Jigawa State Ministry of Health integrates mandatory calcium supplementation into routine antenatal clinic care packages. Furthermore, targeted antenatal nutrition education must be expanded to dismantle cultural food taboos regarding egg and fish consumption, alongside public campaigns promoting affordable, highly bioavailable local calcium sources.

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**SUB-THEME : Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery**

# Diabetes Self-Care Management Practices and Knowledge of Type 2 Diabetes Outpatients in Federal Medical Centre, Abeokuta

**Adepoju, Adeyinka Bukunmi and *Odebunmi, Sunday**

Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

*Sundayodebunmi01@gmail.com, +2349031500204

**Keywords:** *Type 2 diabetes mellitus, self-care management, diabetes knowledge, self-care practices, outpatients.*

**Highlight:**

- Diabetes self-care knowledge was generally moderate to good, yet self-care practices remained suboptimal across all domains.
- No statistically significant association was found between knowledge level and self-care performance, indicating that knowledge alone is insufficient to drive behaviour change.

## BACKGROUND AND OBJECTIVE

Type 2 diabetes mellitus (T2DM) accounts for over 90% of diabetes cases, yet evidence on the relationship between knowledge and actual self-care practices among outpatients in southwestern Nigeria remains limited. This study assessed diabetes self-care management practices and knowledge among type 2 diabetes outpatients at Federal Medical Centre, Abeokuta, Ogun State, Nigeria.

## MATERIALS AND METHODS

A descriptive cross-sectional research design was used with 73 adult outpatients diagnosed with T2DM at Federal Medical Centre, Abeokuta's endocrinology clinic, selected using a multi-stage sampling. Data were collected using a self-administered questionnaire comprising socio-demographic characteristics, diabetes-specific characteristics, Diabetes self-care management knowledge (DSCKQ-30) [1], and Diabetes self-care management practices. (SDSCA) [2]. Knowledge scores were classified as poor (<49%), moderate (50–69%), or good (≥70%), while self-care performance was rated as poor (0–2.99 days), moderate (3–4.99 days), or good (5–7 days) per week. Data were analysed using descriptive statistics and Chi-square test at $p \leq 0.05$ with SPSS version 26.0.

## RESULTS AND DISCUSSION

The study population was predominantly female (72.6%), Yoruba (84.9%), married (71.2%), and highly educated (64.4% holding HND or B.Sc. degrees). Most respondents (42.5%) were retirees earning between ₦70,001 and ₦150,000 monthly (47.9%). The majority (68.5%) managed diabetes through a combination of diet, physical activity, and medication, while hypertension was the most prevalent comorbidity (52.1%).

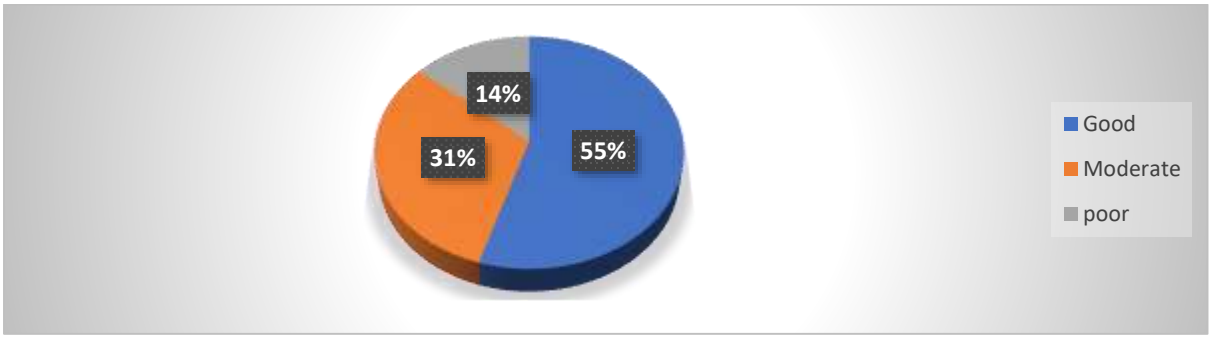



**Figure 1: Overall diabetes self-care knowledge of the study population.**

**Table 1. Association: Knowledge Level and Self-Care Performance (Chi-square)**

| Domain | $\chi^2$ value | p-value |
|---|---|---|
| Dietary self-care | 2.623 | 0.854 (NS) |
| Exercise self-care | 9.693 | 0.138 (NS) |
| Blood glucose monitoring | 8.715 | 0.190 (NS) |

The absence of significant knowledge–practice associations is further consistent with broader literature from sub-Saharan Africa [3], confirming that structural, financial, and motivational barriers are stronger determinants of self-care than knowledge.

## CONCLUSION AND RECOMMENDATIONS

Despite moderate to good diabetes self-care management knowledge, practices remained suboptimal, with knowledge alone insufficient to predict self-care behaviour. Structured diabetes self-management education (DSME) programmes addressing knowledge gaps, individualised dietary counselling, exercise prescriptions, foot care education, and subsidised blood glucose monitoring are recommended at Federal Medical Centre, Abeokuta.

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**SUB-THEME: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery**

# Assessment of Nutritional Status and Diet Quality of Type 2 Diabetes Out-Patients Attending State Hospital, Ijaye, Abeokuta

***Adepoju, A.B., and Olaniyan, S.S.**

[1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

*Olaniyansundaystephen@gmail.com, +2348109122225

**Keywords:** Type 2 diabetes, anthropometric status, diet quality, dietary diversity, outpatients

## BACKGROUND AND OBJECTIVES

Type 2 diabetes mellitus (T2DM) is an increasing public health concern in Nigeria, with overweight, obesity, and sub-optimal dietary practices contributing to adverse health outcomes [1]. This study assessed the nutritional anthropometric measurements and diet quality of T2DM out-patients attending State Hospital, Ijaye, Abeokuta.

## MATERIALS AND METHOD

A descriptive cross-sectional design was used. Using a multistage sampling technique, a total number of Eighty (80) adult out-patients living with type 2 diabetes were selected from the out-patients clinic of Ogun State Hospital Ijaye. A semi-structured interviewer-administered questionnaire was used to elicit data on socio-demographic and diabetes-specific characteristics of the study population. Anthropometric measurements (weight, height, waist circumference, and hip circumference) of the respondents were taken using standard procedures; Body Mass Index (BMI) and waist-to-hip ratio (WHR) were calculated. The Global Diet Quality Questionnaire (DQQ) [2] was used to assess indicators of diet quality like; indicators of dietary adequacy (MDD and All-5), indicators of protection against non-communicable diseases (NCD-Protect and NCD-Risk), and the Global Dietary Recommendation (GDR) score. All data were analysed using the Statistical Package for Social Science (SPSS) version 26.

## RESULTS AND DISCUSSION

A high proportion of the respondents were female (67.5%), Yoruba (95%) and married (71.2%), with a mean age of 60.96 years. More than half (70.58%) of the study population were also managing hypertension. Mean BMI was 26.39±4.88 kg/m²; females (27.44kg/$m^2$) had significantly ($p< 0.05$) higher BMI than males ( 24.21 kg/m²) as presented in Table 1. the waist-to-hip ratio

(WHR) of more than half (62.5%) of the study population fall under the category of high risk. Mean DDS was 4.88±1.62/10, with 62.5% achieving adequate dietary diversity (≥5). Also, mean All-Five score was 3.67±1.03/5, with only 17.5% consuming all five food groups on the recall day; mean NCD-Protect score was 2.83±1.37/9; NCD-Risk score was low at 0.78±1.21/9; and GDR averaged 10.96±2.03/18 (Table 2). Positive and significant relationship was observed between the BMI and WHR (r=0.251, p=0.025). However, none of the diet quality indices significantly (p> 0.05) correlated with BMI. However NCD-Protect score was found to be negatively correlated with WHR but the association was marginally significant (r=−0.220, p=0.050) (Table 3)

**Table 1: Nutritional Status of Respondents Based on BMI And WHR Risk Category (n=80)**

| **BMI Category** | **(n)** | **(%)** |
|---|---|---|
| Underweight (<18.5 kg/m²) | 5 | 6.2 |
| Normal weight (18.5–24.9 kg/m²) | 26 | 32.5 |
| Overweight (25.0–29.9 kg/m²) | 35 | 43.8 |
| Obese (≥30.0 kg/m²) | 14 | 17.5 |
| **WHR Risk Category** | | |
| Low risk (M < 0.90; F < 0.80) | 5 | 6.2 |
| Moderate risk (M; 0.90-0.99 F; 0.80-0.84) | 25 | 31.2 |
| High risk (M ≥1.00; F ≥0.85) | 50 | 62.5 |

**Table 2: Diet Quality Indices of Respondents (n=80)**

| **Diet Quality Index** | **Mean ± SD** | **Min** | **Max** | **Adequate (≥cut-off), %** |
|---|---|---|---|---|
| DDS (max 10) | 4.88 ± 1.62 | 0 | 8 | 62.5 (≥5) |
| All-Five Score (max 5) | 3.67 ± 1.03 | 0 | 5 | 17.5 (=5) |
| NCD-Protect Score (max 9) | 2.83 ± 1.37 | 0 | 6 | — |
| NCD-Risk Score (max 9) | 0.78 ± 1.21 | 0 | 8 | — |
| GDR Score (max 18) | 10.96 ± 2.03 | 2 | 15 | — |

**Table 3: Association between Anthropometric Indices and Diet Quality Indices (n=80)**

| | **BMI** | | **Waist-to-Hip Ratio** | |
|---|---|---|---|---|
| **Variable** | **r** | **p** | **r** | **p** |
| WHR | 0.251* | 0.025 | — | — |
| Dietary Diversity Score | -0.076 | 0.502 | -0.061 | 0.591 |
| All-Five Score | -0.016 | 0.885 | -0.125 | 0.271 |
| NCD-Protect Score | -0.041 | 0.715 | -0.220 | 0.050* |
| NCD-Risk Score | -0.082 | 0.469 | -0.085 | 0.454 |
| GDR Score | -0.006 | 0.959 | -0.093 | 0.412 |

**Significant at p<0.05. DDS=Dietary Diversity Score; GDR=Global Diet Quality Ratio; WHR=Waist-to-Hip Ratio.*

## CONCLUSION AND RECOMMENDATION(S)

T2DM out-patients at State Hospital Ijaye exhibit a high prevalence of overweight, obesity and central adiposity, alongside suboptimal dietary diversity. Only 17.5% of the study population consumed foods in the category of All-5. The mean NCD-Protect Score was found to be 2.83 ± 1.37, while NCD-Risk Score was 0.78 ± 1.21. Routine anthropometric screening and structured Medical Nutrition Therapy by registered dietitian-nutritionists should focus on culturally tailored counselling to improve protective food, all-five intake and reduce central obesity risk.

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**SUB–THEME:** INNOVATIONS IN CLINICAL NUTRITION PRACTICE ACROSS THE LIFE CYCLE: ALIGNING EVIDENCE-BASED PROTOCOLS WITH HEALTH SYSTEM DELIVERY

**TITLE:** Assessment Of Street Food Consumption Pattern, Factors Influencing Parental Food Choices And Prevalence Of Dental Caries Among School-Age Children In Selected Hospitals In Abeokuta, Ogun State.

**NAME OF AUTHOR:** *IBILAYE H.O[1] & ABDUSSALAAM R.O[1]

**AFFILIATION OF AUTHOR:** DEPARTMENT OF NUTRITION AND DIETETICS, FEDERAL UNIVERSITY OF AGRICULTURE, ABEOKUTA

* hannahibilaye@gmail.com, +234 - 9069001167

**KEYWORDS:** Dental caries, street food consumption, parental food choice,dmft.

**BACKGROUND AND OBJECTIVE:**

Dental caries remains one of the most common oral health problems among school-age children despite being largely preventable (1). In Nigeria, several studies have identified dietary habits, oral hygiene practices, and socioeconomic factors as major contributors to the development of dental caries among school-age children (2). This study therefore aimed to assess the street food consumption pattern, factors influencing parental food choices, and the prevalence of dental caries among school-age children attending selected hospitals in Abeokuta, Ogun State.

**MATERIALS AND METHODS:** A descriptive cross-sectional study was conducted among 170 school-age children aged 6–12 years and their parents or guardians from selected hospital (Federal Medical Centre & State Hospital Ijaiye) in Abeokuta, Ogun State. The sample size was determined using single proportion formula. Data were collected using an interviewer-administered questionnaire, a Food Frequency Questionnaire (FFQ), a Food Choice Questionnaire (FCQ), anthropometric measurements, and dental examination using the dmft index (Decayed, Missing and Filled Teeth). The obtained data were analyzed using SPSS version 25 with descriptive and inferential statistics. Statistical significance was set at $p < 0.05$.

**RESULTS AND DISCUSSION:** More than half of the children (54.7%) were between the age of 6 to 9 years old with more female respondent (57.6) than male. The findings showed that most of the children (65.9%) had normal nutritional status, while (19.4%) were underweight. Biscuits were the most commonly consumed street food with (81.8%) consuming them daily and more than half (54.7%) of the children consumed sweet and candies daily. The study revealed poor dietary habits among many children. Almost half (46.5%) of the children consumed sugary beverages daily, while (65.9%.) ate snacks between meals every day. Although all children reported brushing their teeth daily, only (18.2%) brushed twice a day as recommended. Health and nutrition emerged as the most important factor influencing parental food choices. The prevalence of dental caries was (62.4%), with a mean dmft score of $1.66 \pm 1.60$. There was a significant relationship between parental food choices and dental caries ($p < 0.05$), as well as between street food consumption and dental caries ($p < 0.05$). However, dietary habits and oral hygiene practices were not significantly associated with dental caries.

**CONCLUSION AND RECOMMENDATION:** The study showed that dental caries is common among school-age children in the study area and is associated with both parental food choices and street food consumption. Strengthening nutrition education, encouraging healthier food choices, and promoting good oral health practices among parents and children may help reduce the burden of dental caries.

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**Theme/sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

# PHYTOCHEMICAL SCREENING, ANTIOXIDANT ACTIVITIES AND QUANTIFICATION OF SELECTED PHYTOCHEMICALS IN *MORINDA CITRIFOLIA*(NONI) FRUIT AND LEAF AQUEOUS EXTRACTS

**Ekundare O.K.[1], Omolade O.E.[2], Ogunkunle M.[1]**

[1]Department of Food Science and Nutrition, Landmark University, Omu-Aran, Kwara State

[1]Department of Human Nutrition and Dietetics, University of Ibadan, Ibadan, Oyo State.

[2]Department of Human Nutrition and Dietetics, University of Ilesa, Ilesa, Osun State

*Corresponding author, e-mail: ekundare.omotunde@lmu.edu.ng, +2347066385511.

**KEYWORDS: Antioxidant Activity, *Morinda Citrifolia,* Phytochemicals, *DPPH, FRAP***

**HIGHLIGHTS**

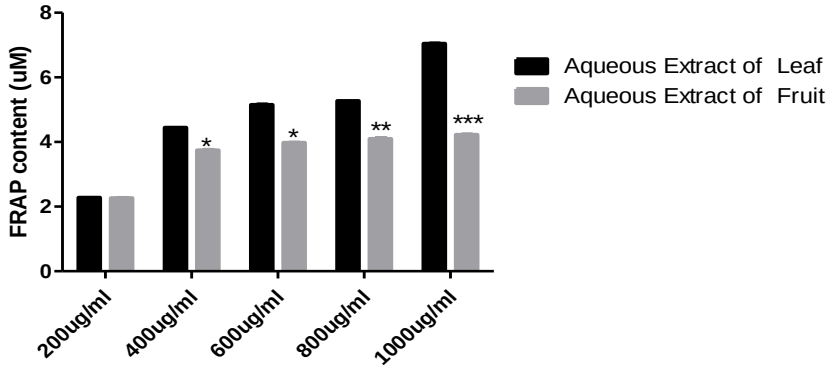
- *Morinda citrifolia* Leaf had the highest free radical inhibition (56.63±0.12)
- The lowest inhibition (39.13±0.12) was obtained for *Morinda citrifolia* fruit
- The findings show *Morinda citrifolia* can serve as good low-cost alternatives for functional foods or natural antioxidant ingredients

**BACKGROUND AND OBJECTIVES:** It is generally known that oxidative stress plays a part in vascular disease, diabetes, renal ischemia, atherosclerosis, pulmonary pathological states, inflammatory illnesses, and cancer [1]. The efficacy of *M. citrifolia* on antioxidant, anti-inflammatory, anticancer, antibacterial, diabetes and cardiovascular disease has been reported [2]. This study scrutinized the phytochemical profile and antioxidant properties of *Morinda citrifolia* (Noni) fruit grown in Nigeria for their potential health benefits.

**MATERIALS AND METHOD**. Fruit and leaf samples of *M. citrifolia* were prepared via aqueous extraction method. Qualitative phytochemical screening for antioxidants was carried out using a battery of chemical test. Total phenols and flavonoids were quantified using Folin–Ciocalteu and aluminum chloride colorimetric methods, respectively. Antioxidant activity of the fruit and leaf extracts was determined using Ferric Reducing Antioxidant Power(FRAP) and 2,2-Diphenyl-1-picryl-hydrazyl-hydrate(DPPH) assays.Analysis was carried out using Graph-pad Prism statistical package version 5.

**RESULTS AND DISCUSSION:** Qualitative screening showed Both aqueous leaf and fruit extracts of *Morinda citrifolia* contain flavonoids, Phenols, saponins, tannins, alkaloid, Terpenoids in the samples. Similar findings have been reported for the presence of phenols, flavonoids, saponins, alkaloids, tannins[3]. The leaf extract contained significantly more flavonoids ($p \leq 0.05$). The leaf extract also demonstrated superior antioxidant activity, exhibiting higher DPPH radical scavenging (56.63±0.12%) and FRAP (7.042±0.003) values than the fruit extract.

**Figure 4.1:** Scavenging effect of extracts on Ferric Reducing Antioxidant Power (FRAP) radical.




**CONCLUSION AND RECOMMENDATION(S):** The outcome of this research study indicates the potential antioxidants (free radical scavenging) activity of the fruit and leaf extract of *M. citrifolia* which can be attributed to the presence of secondary metabolites. This study shows that *M. citrifolia* can have positive influence on the health of consumers and could also serve as good low-cost alternatives for functional foods or natural antioxidant ingredients.

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**Sub-theme:** Clinical Nutrition practice Across the Life Cycle: Aligning Evidence-Based protocols with Health System Delivery

**Title:** Relationship between Nutritional status and Blood pressure of apparently healthy primary school pupils in Zaria Local Government Area of Kaduna state

**Name of Author (s):** *Suleiman Ubangida[1], O.A. Owolabi[2], A. Olagunju[2], I.A.A. Ibrahim[1], Muhammad Rabiu Aliyu[1], Abdulkadir Muhammad[2], Muhammad Auwal Tamsab[2], Suleiman Abdullahi[2], Abubakar Tanimu Umar[3], Said Sani Said[4],

**Affliation of the Authors:**

[1]Department of Human Nutrition and Dietetics, Federal University of Health Sciences, Azare

[2]Department of Biochemistry, Ahmadu Bello University, Zaria

[3]National Agency of Food and Drug Administration and Control

[4]Department of Biochemistry and molecular Biology, Federal University Dutsin-Ma

***Corresponding author;** e-mail: Suleiman.ubangida@fuhsa.edu.ng, +2348036848302

**Key words:** nutritional status, blood pressure, anthropometry, school pupils

**Highlight:**

- Systolic BPs, Diastolic BPs and Mean arterial pressures (MAP) were associated with BMI-for-age
- Height also correlate with blood pressures parameters: Systolic BPs, Diastolic BPs and Mean arterial pressures

**Background and Objectives:** Anthropometric indices have become practical tools for evaluating the nutritional status of populations [1]. Understanding the nutritional status of children has far-reaching implications for promoting the health of future generations [4]. Regardless of pupil/child age, measurement of the blood pressure should be part of routine physical examination [3]. Its value as a screening tool for hypertension in adults has long been documented [5].

This study was designed to establish relationship between the blood pressure and Anthropometric measures in apparently healthy enrolled primary school pupils aged 6-12 years in Zaria Local Government area of Kaduna state.

**Materials and Method:** The study was conducted on 219 pupils (115 males and 104 females) randomly select from public and private school using table of random numbers. Blood pressure were measure after 5 minutes of rest in the sitting position with an aneroid sphygmomanometer and a cuff suitable to the subject's (pupil/child) arm circumference according (WHO) standard procedures. Nutritional and growth status were determined using z-score for BMI-for-age and height-for-age (HA). Pearson correlation was used to find correlation coefficients between anthropometry indices and blood pressure parameters.

**Results and Discussion:** Severe underweight z-score < -3 occurred in 4.34% (n=5) of boys and 1.92% (n=2) of girls respectively, also severe stunting <-3 occurred in 2.61% (n=3) of boys and 1.92% (n=2) of girls. Significant difference (P<0.05) was not observed between severe underweight or stunting boys from the girls. There is a positive correlation between weight and Systolic BPs, Diastolic BPs and Mean arterial pressures of the subjects (*r*=0.77, 0.61, and 0.74 respectively). There is also significant differences (P<0.05) in the mean Systolic BP, Diastolic BP and Mean Arterial Pressure respectively, but all the anthropometry and blood pressure parameters was significantly higher in boys than girl (Table: 1).

**TABLE 1: Anthropometry and Blood Pressure Parameters of apparently healthy Children attending Private and public Schools in Zaria Local Government Area of Kaduna State**

| Parameters | Private schools N=91 | | Public schools N=128 | | All schools N=219 | |
|---|---|---|---|---|---|---|
| | Boys n=48 | Girls n=43 | Boys n=67 | Girls n=61 | Boys n=115 | Girls n=104 |
| **Weight (kg)** | 27.05±0.27$^{a}$ | 27.57±0.57$^{a}$ | 27.09±0.78$^{a}$ | 24.71±0.59$^{d}$ | 26.92±0.48$^{b}$ | 25.96±0.32$^{c}$ |
| **Height (cm)** | 134.56±1.73$^{a}$ | 132.23±1.77$^{b}$ | 129.90±1.39$^{c}$ | 127.82±1.78$^{d}$ | 131.13±1.49$^{b}$ | 129.94±1.84$^{c}$ |
| **MUAC (cm)** | 170.25±1.73$^{a}$ | 170.26±1.09$^{a}$ | 167.94±2.85$^{b}$ | 167.68±1.23$^{b}$ | 168.55±1.34$^{b}$ | 169.05±0.84$^{a}$ |
| **BMI (kg/m$^2$)** | 14.73±1.39$^{b}$ | 15.24±2.00$^{a}$ | 15.93±2.24$^{a}$ | 14.86±1.69$^{b}$ | 15.46±2.00$^{a}$ | 15.06±1.86$^{a}$ |
| **SBP (mmHg)** | 93.13±6.73$^{a}$ | 89.69±6.93$^{c}$ | 91.33±11.09$^{b}$ | 88.48±9.91$^{c}$ | 91.85±9.52$^{b}$ | 89.15±9.12$^{c}$ |
| **DBP (mmHg)** | 59.41±8.51$^{a}$ | 57.02±7.24$^{b}$ | 57.76±8.85$^{b}$ | 56.08±9.16$^{c}$ | 57.14±8.54$^{b}$ | 56.46±8.39$^{c}$ |
| **MAP (mmHg)** | 69.99±7.69$^{a}$ | 67.91±6.87$^{c}$ | 68.28±0.28$^{b}$ | 66.88±169$^{e}$ | 68.71±7.78$^{d}$ | 67.35±8.18$^{c}$ |

Values are expressed as MEAN±SD Values with different superscripts differs significantly at p<0.05

**Conclusion and Recommendation:** The study found out that severe malnutrition exists among the pupils, as significant percentages of the school children were underweight and stunted. Blood pressure increased with age and higher from private schools than those from public schools. There is need for improvement in the nutritional status of these children. As the quality of future human resources depends on the present day children, improvement of the nutritional level of today's children should be given top priority.

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**Sub-Theme: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery**

**Title:** In Vitro and Ex-Vivo Evaluation of the Antidiabetic and Antioxidant Potentials of Cissus populnea (Okoho) Stem and Bark Extracts

Author(s): Aloysius, M.T.[1] and Yusuf, T.A.[2]

Affiliations: [1]Department of Nutrition and Dietetics, Federal Polytechnic, Nasarawa; [2]Department of Hospitality and Management Technology, Federal Polytechnic, Nasarawa

Corresponding author: aloysiusmorris500@gmail.com | Phone: 08064387697

**Keywords:** Cissus populnea, alpha-amylase, antioxidant, diabetes

## Highlights

• Okoho stem exhibited superior α-amylase (63.56%) and α-glucosidase (69.56%) inhibition compared with bark at 200 µg/mL.

• Both stem and bark extracts demonstrated moderate DPPH and FRAP antioxidant activities.

• Fresh Okoho extract significantly reduced mean fasting blood glucose from 21.78±5.09 to 14.33±9.83 mmol/L after 7 days ($p<0.05$).

## Background and Objectives

Diabetes mellitus is a leading metabolic disorder associated with chronic hyperglycaemia and oxidative stress, with an increasing burden in low- and middle-income countries (World Health Organization) (WHO) [1], [2]. Medicinal plants remain important complementary resources for improving glycaemic control. Cissus populnea (Okoho) contains phytochemicals with potential enzyme inhibitory and antioxidant properties. This study compared α-amylase and α-glucosidase inhibition by stem and bark extracts, evaluated antioxidant activity using 2,2-Diphenyl-1-Picrylhydrazyl (DPPH) and Ferric Reducing Antioxidant Power (FRAP) assays, and assessed the effect of fresh Okoho extract on fasting blood glucose in type 2 diabetic volunteers.

## Materials and Methods

Authenticated stem and bark samples were air-dried, powdered, extracted with hot distilled water and lyophilised. Enzyme inhibition assays were conducted at 25–200 µg/mL using acarbose as the standard. Antioxidant activity was determined through DPPH and FRAP assays using ascorbic acid as standard. Four consenting type 2 diabetic volunteers consumed 20 mL fresh Okoho extract daily for seven days before repeat fasting blood glucose (FBG) assessment. Data were expressed as mean ± SD and analysed using one-way ANOVA with Tukey's post hoc test ($p<0.05$). The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Federal Polytechnic, Nasarawa.

## Results and Discussion

Both extracts inhibited α-amylase and α-glucosidase in a dose-dependent manner. At 200 µg/mL, stem extract produced 63.56±1.28% α-amylase inhibition and 69.56±0.75% α-glucosidase inhibition, exceeding bark activity (62.48±0.63% and 64.96±1.38%, respectively), although acarbose remained superior. Moderate antioxidant activity was demonstrated by both extracts. Mean FBG decreased significantly from 21.78±5.09 to 14.33±9.83 mmol/L (34.2% reduction),

although individual responses varied. The findings are consistent with evidence that plant phenolics inhibit carbohydrate-digesting enzymes and reduce oxidative stress [3], [4], [5].

**Table 1: Alpha amylase percentage inhibition comparison of Okoho stem, bark and acarbose at different levels of concentration**

| Concentration ($\mu g$/ml) | Okoho stem | Okoho bark | Acarbose |
|---|---|---|---|
| 200 | $63.56\pm1.28^{a}$ | $62.48\pm0.63^{a}$ | $87.32\pm0.87^{b}$ |
| 100 | $54.39\pm1.09^{a}$ | $50.86\pm0.72^{a}$ | $78.32\pm0.53^{b}$ |
| 50 | $40.28\pm1.57^{a}$ | $39.43\pm1.54^{a}$ | $60.32\pm3.23^{b}$ |
| 25 | $27.32\pm2.28^{a}$ | $22.43\pm0.88^{a}$ | $45.53\pm1.64^{b}$ |

*Results are expressed as mean value ± SD of triplicate determinations. Different superscripts in each row means that the percentage inhibition comparison for both Okoho stem, bark and acarbose is significantly different $p< 0.05$*

**Table 2: Fasten blood sugar test of volunteers with confirmed cases of diabetes administered with fresh extract of Okoho**

| Volunteers | Before Okoho extract (mmol/L) | After Okoho extract (mmol/L) |
|---|---|---|
| W | $29.20\pm0.10^{b}$ | $6.40\pm0.10^{a}$ |
| X | $21.60\pm0.20^{a}$ | $27.50\pm0.20^{b}$ |
| Y | $17.50\pm0.30^{b}$ | $4.50\pm0.30^{a}$ |
| Z | $17.50\pm0.40^{a}$ | $18.90\pm0.40^{b}$ |
| Average | $21.78\pm5.09^{b}$ | $14.33\pm9.83^{a}$ |

*Results are expressed as mean value ± SD of triplicate determinations. Different superscripts in each row means that the fasten blood sugar test for both before and after of okoho extract is significantly different*

## Conclusion and Recommendations

Okoho stem and bark possess promising in vitro antidiabetic and antioxidant activities, with stem extract showing greater enzyme inhibition. Fresh extract demonstrated glucose-lowering potential ex-vivo, supporting its traditional use as a complementary nutraceutical. Larger randomized controlled trials, HPLC-MS phytochemical characterization, toxicological evaluation and mechanistic investigations are recommended before clinical application.

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**Theme:** Delivering Better Nutrition for all: Connecting the Dots across Life cycle, Systems & Sectors
**Sub-theme:** Innovation in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocol with Health System Delivery
**Title:** Nutraceuticals in Non-Alcoholic Fatty Liver Disease: Evidence from Randomized Trials on Cardiometabolic And Hepatic Outcomes

**Name of Author (s):** *Olukogbe, O.O.[1], Ibirogba, D.A.[2], Abate, E.[3], Engmann, S.T.[4], Olowu, B.I.[5], Abdulraheem, A.S.[6], Mergerssa, T.B.[7] and Kusemwa, P.M.[8]

**Affiliation of Author (s):**

[1] Dept. of Human Nutrition and Dietetics, University of Ibadan, Nigeria
[2] Centre for Health and Life Sciences, Coventry University, UK
[3] Medical Biochemistry Dept., School of Medicine, Addis Ababa University, Ethiopia;
[4] Dept. of Medicine and Therapeutics, University of Cape Coast, Accra, Ghana;
[5] Dept. of Microbiology and Pathology, Washington State University, Pullman, USA;
[6] Faculty of Pharmaceutical Science, University of Lagos, Nigeria;
[7] Dept. of Surgery, Addis Ababa University, Ethiopia;
[8] Dept. of Nursing and Midwifery, University of Rwanda

***Corresponding author:** Olukogbe, O.O., e-mail: olukogbegbemisola@gmail.com, +2349067432826

**Keywords:** Silymarin; Non-alcoholic fatty liver disease (NAFLD); Non-alcoholic steatohepatitis (NASH); Nutraceuticals

## Highlights

- Silymarin significantly reduced BMI, cholesterol, and triglycerides in NAFLD
- Meta-analysis pooled 540 patients from 8 RCTs among 32 included studies
- Waist circumference and HDL-cholesterol showed no significant change in NAFLD

## BACKGROUND AND OBJECTIVES

Non-alcoholic fatty liver disease (NAFLD) is a hepatic manifestation of metabolic syndrome and a major contributor to cardiovascular risk, with no currently approved pharmacological treatment. Food bioactive substances (FBS) have been proposed as adjunctive strategies for NAFLD/NASH, but clinical evidence remains inconsistent. This review evaluated the effectiveness of FBS on hepatic and cardiometabolic outcomes in NAFLD/NASH patients [1].

## MATERIALS AND METHOD

Six databases (PubMed, Embase, Scopus, ProQuest, CINAHL, Cochrane) were searched using keywords, yielding 10,969 articles. PRISMA guidelines were followed [2], and the protocol was registered on PROSPERO (CRD42023479102). Screening, quality assessment, and data extraction were performed in Covidence, yielding 32 included RCTs. RevMan 5.3 was used for meta-analysis, pooling standardized mean differences (SMDs) with 95% CIs via fixed- and random-effects models; $I^2$ assessed heterogeneity.

## RESULTS AND DISCUSSION

Across the 32 included studies, FBS influenced markers of inflammation, glycaemia, insulin resistance, dyslipidaemia, obesity, and liver injury, including reductions in hepatic enzymes,

steatosis, and fibrosis. A meta-analysis of 540 patients from 8 RCTs pooled the effects of the three most-studied compounds: silymarin, curcumin, and resveratrol on BMI, waist circumference, LDL-C, HDL-C, total cholesterol, and triglycerides (Table 1). Silymarin produced the largest, significant reduction in BMI (SMD = -0.59; 95% CI: -0.85 to -0.33; $I^2$ = 77.0%). Waist circumference did not change significantly for any compound (SMD = -0.43; $I^2$ = 2.4%). LDL-C fell slightly (SMD = -2.16), driven mainly by silymarin, but lost significance under the random-effects model. HDL-C was unchanged overall (SMD = 0.01; $I^2$ = 96.7%). Total cholesterol (SMD = -7.13) and triglycerides (SMD = -10.35) both fell significantly, again mainly attributable to silymarin [3-5]. Silymarin was shown to be most consistently associated with improvements in cardiometabolic markers.

**Table 1: Subgroup meta-analysis of food bioactive compounds on cardiometabolic markers in NAFLD**

| Outcome | Curcumin (SMD) | Resveratrol (SMD) | Silymarin (SMD) | Interpretation |
|---|---|---|---|---|
| **BMI (kg/m²)** | -0.03 | -0.15 | -0.59* | Silymarin: significant ↓ |
| **Waist Circumference** | -0.23 | +0.12 | -0.43 | No significant change |
| **LDL-C (mg/dL)** | -0.17 | -0.15 | -2.16 | Slight ↓; not significant |
| **HDL-C (mg/dL)** | +0.22 | +0.05 | 0.01 | Unchanged overall |
| **Total Cholesterol** | -0.02 | -0.18 | -7.13* | Significant ↓, mainly Silymarin |
| **Triglycerides** | -0.03 | -0.12 | -10.35* | Significant ↓ (moderate $I^2$) |

**Statistically significant reduction (common-effect model). SMD = standardized mean difference.*

## CONCLUSION AND RECOMMENDATION

Silymarin appeared to be the most promising intervention, particularly for reducing BMI, LDL-C, total cholesterol, and triglycerides, but high variability across studies limits generalizability. Well-powered, standardized multicentre RCTs with longer follow-up are recommended to confirm these cardiometabolic and hepatic benefits in NAFLD.

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**Theme/Sub-theme: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery**

**Title: Capacity of Primary Health Care Facilities to Deliver Nutrition Services in Selected Urban Areas of Ibadan, Oyo State, Nigeria.**

**Authors: *Manawa, O.[1], Makinde, J.[1], Ariyo, O.[1], Ojo, N.[1], Oladejo, E.[1], and Jidda, K.[2]**

**Affiliation of authors:** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo State, Nigeria

[2]Department of Health Promotion and Environmental Health Education, University of Ilorin, Kwara State, Nigeria.

*Corresponding author: manawavwede@gmail.com +2348140942553

**Keywords:** Primary Health Care, Nutrition Services, Health System Capacity, Urban Health

**Highlights**

- 85.0% of PHCs offered nutrition services, but only 7.5% had a nutritionist
- No facility provided therapeutic or supplementary feeding for malnutrition
- Only 12.5% of facilities analysed nutrition data for local decision-making

**BACKGROUND AND OBJECTIVES**: Primary health care (PHC) is the cornerstone for delivering essential nutrition interventions and advancing nutrition targets [1]. In Nigeria, about 40% of children under five are stunted. In Oyo State, stunting, underweight, and severe acute malnutrition affect 23.1%, 26.1%, and 14.4% of children under five, and malnutrition contributes to nearly half of under-five deaths [2]. Although national policy and NPHCDA Minimum Standards mandate nutrition commodities, infrastructure, and trained personnel at PHC level, how far these mandates are operationalised in urban settings remains poorly documented. This study assessed the capacity of PHC facilities to deliver nutrition services in three urban LGAs of Ibadan, Nigeria.

**METHODS**: A descriptive cross-sectional study was conducted in 40 out of 44 PHC facilities included by total sampling in Ibadan North, Ibadan North-West, Ibadan South-East. Data were collected using a semi-structured questionnaire (based on the Uganda Nutrition Service Delivery Assessment Tool), direct observation, and interviews with Officers-in-Charge. Nutrition service capacity was evaluated across 11 domains and categorised as poor, fair, good, or excellent based on pre-defined criteria. Data were analysed using descriptive statistics on SPSS 26.0.

**RESULTS AND DISCUSSION**: Most (85.0%) facilities offered nutrition services, with strong performance in basic anthropometric assessments for children under five: weight (100.0%), MUAC (97.5%), height (85.0%) and preventive interventions: vitamin A supplementation (97.5%), and iron-folic acid (97.5%) for pregnant women (Table 1). Significant gaps existed: only 7.5% had a qualified nutritionist/dietitian; human resource capacity was poor in 70.0% of facilities; clinical management (counselling, referral, follow-up) was limited; no facility provided therapeutic or supplementary feeding; quality improvement systems were poor in 100.0%; and data use for decision-making was weak (only 12.5% analysed/displayed nutrition data). Overall, 75% of the facilities showed good service provision but limited readiness in infrastructure, equipment, and systems (Figure.1). This “screening-without-management” pattern, whereby

growth monitoring rarely translates into effective care pathways, echoes gaps reported across other low- and middle-income country PHC assessments [3], indicating that policy integration of nutrition into PHC has outpaced the workforce and systems investment needed to sustain it.

**CONCLUSION AND RECOMMENDATION(S)**: PHC facilities in urban LGA in Ibadan demonstrated good capacity in basic nutrition screening and preventive nutrition services, but show critical gaps in workforce, clinical management, quality-improvement, and data-use systems that limit comprehensive nutrition care. Targeted investment in nutrition workforce hiring and training, equipment, quality-improvement systems, and data utilisation is recommended to strengthen nutrition service delivery.

**Table 1:** Nutrition Service Provision Indicators by Domain in Primary Health Care Facilities (N = 40)

| Indicator | N (%) |
|---|---|
| General facility information – Offered nutrition services | 34 (85.0) |
| General facility information – Had a qualified nutritionist/dietitian | 3 (7.5) |
| Provision of service – Assessed weight correctly and accurately | 40 (100.0) |
| Provision of service – Assessed MUAC correctly and accurately | 39 (97.5) |
| Provision of service – Assessed height/length correctly and accurately | 34 (85.0) |
| Provision of service – Administered vitamin A supplementation | 39 (97.5) |
| Provision of service – Administered iron-folic acid (pregnant women) | 39 (97.5) |
| Provision of service – Provided counselling for malnourished clients | 21 (52.5) |
| Provision of service – Referred malnourished patients | 16 (40.0) |
| Provision of service – Followed-up malnourished patients | 11 (27.5) |
| Provision of service – Provided therapeutic or supplementary foods | 0 (0.0) |
| Monitoring and evaluation – Analysed/displayed nutrition data for decisions | 5 (12.5) |

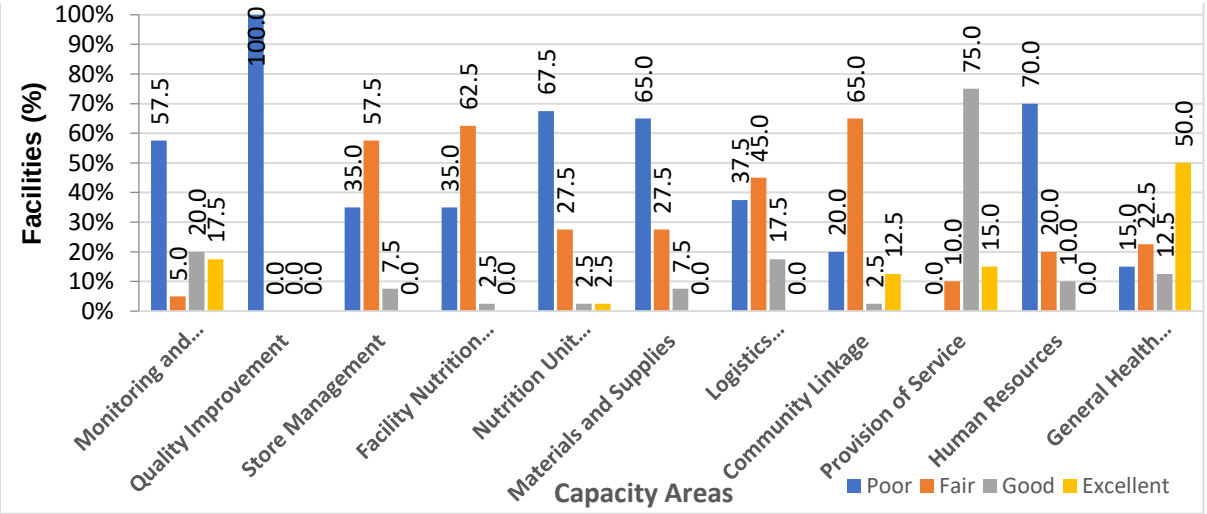



**Figure 1:** Summary of Nutrition Service Capacity Classification by Domain (N=40)

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**THEME**: Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, & Sectors

**SUB-THEME**: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

# ASSESSING PERCEIVED BARRIERS TO SEEKING NUTRITION HELP AMONG YOUNG ADULTS WITH EYE DEFECT (REFRACTIVE ERROR) IN IBADAN, OYO STATE: FOCUS ON IBADAN NORTH AND LAGELU LOCAL GOVERNMENT AREA

Osinaike, A.O.[1], Adedeji, S.A.[2]*, Adeoye, R.O.[3]

[1,2] Department of Dietetics, University College Hospital, Ibadan, Nigeria.

[3] Department of Dietetics, Federal Medical Centre, Epe, Lagos, Nigeria.

*Corresponding Author, email: adedejishukurah27@gmail.com,+2348139185946

**KEYWORDS**

Refractive error; Nutrition help; Eye health; Perceived barriers

## HIGHLIGHTS

- Nutrition help-seeking among young adults with refractive errors was low despite good knowledge of nutrition and eye health.
- Poor awareness, high cost, limited accessibility, and inadequate time were the major barriers to seeking nutrition help.
- Integrating nutrition services into routine eye-care delivery may improve utilization and support better eye health outcomes.

## BACKGROUND AND OBJECTIVES

Refractive errors are a major cause of visual impairment among young adults and remain a significant public health challenge. Nutrition plays an important role in maintaining eye health and preventing nutrition-related ocular disorders [1]. Despite growing evidence of the relationship between nutrition and eye health, utilisation of nutrition services among individuals with refractive errors remains low in many communities due to limited awareness and other health system barriers [2]. Identifying the barriers influencing nutrition help-seeking is essential for improving access to nutrition services and promoting better eye health outcomes. This study therefore assessed the perceived barriers to seeking nutritional help among young adults with eye defects (refractive errors) in the Ibadan North and Lagelu Local Government Areas of Oyo State.

## MATERIALS AND METHODS

A descriptive cross-sectional study was conducted among 90 young adults aged 18–35 years with refractive errors in Ibadan North (urban) and Lagelu (semi-urban) Local Government Areas. Data were collected using a semi-structured questionnaire covering socio-demographic characteristics, knowledge, attitudes and perceptions towards nutrition and eye health, psychosocial influences, perceived barriers, and awareness and utilization of nutrition eye-care services. Data were analysed using descriptive statistics, including frequencies, percentages, means and standard deviations, using SPSS version 23.

## RESULTS AND DISCUSSION

**Table 1. Barriers to Seeking Nutrition Help by Respondents**

| S/N | QUESTION | SA N(%) | A N(%) | D N(%) | SD N(%) |
|---|---|---|---|---|---|
| 1 | Nutrition help services are too expensive. | 18(20) | 42(46.7) | 29(32) | 1(1.1) |
| 2 | I find it difficult to get to a nutrition help center. | 22(24.4) | 48(53.3) | 16(17.8) | 4(4.4) |
| 3 | I don't know where to find nutrition help for eye health. | 27(30) | 42(46.7) | 17(18.9) | 4(4.4) |
| 4 | I am not sure nutrition can help improve my eye condition. | 8(8.9) | 21(23.3) | 50(55.6) | 11(12) |
| 5 | Family or friends don't support me seeking nutrition help. | 8(8.9) | 20(22.2) | 47(52.2) | 15(16.7) |
| 6 | I feel embarrassed or ashamed to ask for nutrition help. | 4(4.4) | 5(5.6) | 54(60.0) | 27(30.0) |
| 7 | Nutrition services available are not trustworthy or effective. | 7(7.8) | 11(12.2) | 60(66.7) | 12(13.3) |
| 8 | I do not have time to seek nutrition advice or help. | 13(14.4) | 31(34.4) | 39(43.3) | 7(7.8) |
| 9 | I fear discrimination or stigma if I seek nutrition help. | 4(4.4) | 5(5.6) | 60(66.7) | 21(23.3) |
| 10 | The quality of nutrition services is poor. | 9(10) | 24(26.7) | 51(56.7) | 6(6.7) |

Myopia was the most prevalent refractive error (61.1%), followed by hyperopia (20.0%) and astigmatism (10.0%), while 72.2% of respondents had experienced their eye defect for more than three years. Although respondents demonstrated good knowledge and positive attitudes towards nutrition and eye health, only 31.1% had ever sought nutrition help, and regular utilization of nutrition services was low (4.4%). Awareness (14.4%) and utilization (3.3%) of community nutrition eye-care services were also poor. The major barriers to seeking nutrition help were poor awareness of available nutrition services, high cost, limited accessibility, and inadequate time. These findings are consistent with previous studies that identified poor awareness, financial constraints, and limited access to healthcare services as major determinants of eye health-seeking behaviour [2,3]. Furthermore, evidence suggests that nutritional inadequacies can adversely affect visual health, underscoring the importance of nutrition in the prevention and management of eye disorders [4]. The persistence of low utilization despite good knowledge indicates that improving awareness alone may be insufficient unless nutrition services are accessible, affordable, and integrated into routine eye-care delivery. Innovative health promotion strategies may also enhance nutrition awareness and encourage positive health-seeking behaviours among young adults [5].

## CONCLUSION

Young adults with refractive errors in Ibadan demonstrated good knowledge and positive attitudes towards nutrition and eye health but exhibited poor nutrition help-seeking behaviour and low utilization of nutrition services. Poor awareness, high cost, limited accessibility, and inadequate time were the major barriers to seeking nutrition help. Addressing these barriers through improved integration of nutrition services into routine eye-care delivery and enhanced public awareness may improve nutrition help-seeking and contribute to better eye health outcomes.

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**Sub-theme: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery**

**Title: Nutritional Status and Prevalence of Metabolic Syndrome among Outpatients In Federal Medical Centre, Abeokuta.**

**Name of Author: -*Amoran, I.V[1] and Adebayo, Y.O.[1]**

**Affiliation of Author(s):** -[1]Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta.

*__Corresponding author__: amoranife@gmail.com, +2348141669626.

**Keywords:** Metabolic syndrome; Nutritional status; Outpatients; Body mass Index (BMI)

**Highlights:**

- Prevalence of metabolic syndrome among adult outpatients was 16.9%.
- Body mass index was significantly associated with metabolic syndrome risk factors among female participants.

## BACKGROUND AND OBJECTIVES

Metabolic syndrome (MetS) is a cluster of metabolic abnormalities that increase the risk of cardiovascular disease and type 2 diabetes mellitus [1]. Unhealthy diet and physical inactivity are key modifiable risk factors for its development. This study aimed to assess the nutritional status and prevalence of metabolic syndrome among outpatients attending the Federal Medical Centre, Abeokuta.

## MATERIALS AND METHODS

This cross-sectional study involved 140 out-patients attending the general out-patient clinic. Data were collected using a semi-structured questionnaire and a 24-hour dietary recall, while anthropometric, biochemical and clinical measurements followed standard procedures. Data were analyzed using descriptive and inferential statistics, with significance set at $p<0.05$.

## RESULTS AND DISCUSSION

The mean age of the respondents was 47.35 ± 16.23 years, with females constituting 54.9% of the study population. Approximately half (49.3%) of the respondents had normal body mass index (BMI), while 32.4% were overweight and 16.2% were obese. The prevalence of metabolic syndrome was 17.1%. More females (58.4%) were at high risk of metabolic syndrome based on waist-hip ratio, whereas 51.5% of males were at low risk. Furthermore, 27.4% of respondents were diabetic, while 40.1% were hypertensive. Significant associations were observed between BMI and fasting blood glucose, random blood glucose, HDL, blood pressure and waist-hip ratio among female participants ($p<0.05$). However, no significant association was observed between nutrient intake and risk factors for metabolic syndrome ($p>0.05$). These findings suggest that excess body weight and abdominal obesity remain important contributors to metabolic syndrome among hospital outpatients.

**Table 1: Prevalence of Metabolic Syndrome**

| Characteristics | Male (%) N=64 | Female (%) N=76 | Total N=140 |
|---|---|---|---|
| **No MetS (<2/5)** | 36(56.3) | 51(67.1) | 87(62.1) |
| **At risk (2/5)** | 15(23.4) | 14(18.4) | 29(20.7) |
| **MetS (>3/5)** | 13(20.3) | 11(14.5) | 24(17.1) |

## CONCLUSION AND RECOMMENDATION

This study revealed a low prevalence of metabolic syndrome among adult outpatients, with body mass index significantly associated with key cardiometabolic risk factors, highlighting the importance of weight management. Therefore, routine anthropometric screening and nutrition education should be reinforced in outpatient care to promote healthy weight management and prevent metabolic syndrome.

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**SUB THEME 6**: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Nutritional Status, Nutritional Knowledge and Quality of Life of Patients with Diabetes Mellitus Attending General Hospital Sango Ota, Ogun State, Nigeria

Bello, Omolara Sherifat and Gabriel, Emmanuel
Department of Nutrition and Dietetics, Federal Polytechnic, Ilaro, Ogun State, Nigeria
Corresponding author: omolarasherifat7@gmail.com

**Keywords:**
Diabetes mellitus; Nutritional status; Nutritional knowledge; Quality of life; BMI

**Highlights**

- Most respondents had normal BMI and good nutrition knowledge.
- Better nutrition knowledge was positively associated with quality of life.
- Routine nutrition education should complement diabetes management.

**Background and Objective**

Diabetes mellitus remains a major public health challenge with increasing prevalence worldwide, particularly in low- and middle-income countries [1]. Appropriate nutrition knowledge and optimal nutritional status are essential components of diabetes self-management and may improve quality of life while reducing complications [2]. This study assessed the nutritional status, nutritional knowledge and quality of life of diabetic patients attending General Hospital Sango Ota, Ogun State.

**Materials and Methods**

A hospital-based cross-sectional descriptive study was conducted among adult patients with diabetes attending the diabetic clinic. A sample of 150 respondents participated using multistage sampling. Data were collected using a validated semi-structured questionnaire covering socio-demographic characteristics, nutritional knowledge and quality of life. Weight and height were measured using standard procedures and BMI classified according to WHO recommendations. Data were analysed using SPSS version 20. Descriptive statistics was used to give summarized variables while Chi-square, ANOVA and correlation analyses was used to show associations at $p<0.05$.

**Results and Discussion**

Most respondents were female (66.7%), aged ≥ 61 years (45.3%), married (72.7%), and had type 2 diabetes mellitus (83.3%). Assessment of nutritional status showed that 36.0% had normal BMI, while 33.3% were overweight, 23.3% obese, and 7.3% underweight. Good nutritional knowledge was observed in 60.0% of the respondents, whereas 33.3% and 6.7% had average and poor nutritional knowledge, respectively. Quality-of-life assessment showed that 82.0%, 76.0%, and 60.0% of the respondents had high quality of life in the satisfaction, impact, and worry domains, respectively. Positive correlations were observed between nutritional knowledge and quality-of-life domains, suggesting that improved nutrition literacy may enhance self-care behaviours and wellbeing. These findings agree with contemporary evidence supporting medical nutrition therapy as a cornerstone of diabetes management [3].

## Conclusion and Recommendations

Adequate nutritional knowledge and healthy nutritional status were associated with better quality of life among people living with diabetes. Continuous nutrition education, individualized dietary counselling, regular anthropometric monitoring and multidisciplinary diabetes care are recommended to improve long-term outcomes.

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**Sub- theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence - Based Protocols with Health System Delivery

**Title:** Proof of Concept Evaluation of the Gastroprotective Effect of Speckled African Yam Bean-Honey Paste Against Diclofenac-Induced Gastric Ulcer in Wistar Rats

**Name of authors:** *[1]Ezenwaka, C.B., [2]Unanam, Iniubong Sunday

**Affliation of Author:** [1]Department of Human Nutrition and Dietetics, Faculty of Health Sciences, Nnamdi Azikiwe University, Anambra State, Nigeria

[2]Department of Human Nutrition and Dietetics, University of Uyo

**Corresponding author Email:** cb.ezenwaka@unizik.edu.ng, Phone no: +2348063843085

**ORCID NUMBER:** 0009000032981120

**KEYWORDS**: African yam bean, gastric ulcer, diclofenac, ulcer- induced

**HIGHLIGHTS:**

- SAYBHP administration was associated with lower gastric ulcer index than the untreated diclofenac-ulcer control in male Wistar rats.
- The 1,000 and 1,500 mg/kg groups showed 100% ulcer-index inhibition relative to the untreated ulcer group, according to the stated calculation.
- The findings suggest potential gastroprotective activity of SAYBHP in the tested diclofenac-induced rat-ulcer model.

**BACKGROUND AND OBJECTIVES**: Peptic Ulcer Disease ( PUD) is the most common gastrointestinal disease with a global prevalence of 40% in industrialized nations and 80% in underdeveloped countries (1). It remains a public health problem commonly associated with a prolonged use of non steroidal anti inflammatory drugs (NSAIDs) (2). Although pharmacological anti- ulcer treatment abound, prolonged usage has been associated with side effects leading to increased interest in food- based approach (3). Speckled African yam bean is an underexploited legume with bioactive compounds while honey possesses gastroprotective effects (4). However, there is a paucity on the use of the flour and honey as a blend for treatment.This study evaluated the gastroprotective effect of speckled African yam bean - honey paste (SAYBHP) on diclofenac potassium ulcer- induced adult male Wistar rats. **BACKGROUND AND OBJECTIVES**: Peptic Ulcer Disease ( PUD) is the most common gastrointestinal disease with a global prevalence of 40% in industrialized nations and 80% in underdeveloped countries (1). It remains a public health problem commonly associated with a prolonged use of non steroidal anti inflammatory drugs (NSAIDs) (2). Although pharmacological anti- ulcer treatment abound, prolonged usage has been associated with side effects leading to increased interest in food- based approach (3). Speckled African yam bean is an underexploited legume with bioactive compounds while honey possesses gastroprotective effects (4). However, there is a paucity on the use of the flour and

honey as a blend for treatment.This study evaluated the preliminary gastroprotective effect of speckled African yam bean - honey paste (SAYBHP) on diclofenac potassium ulcer- induced adult male Wistar rats.

**MATERIALS AND METHODS:** The speckled African yam bean flour and honey were mixed in a 1: 4 (w/w) ratio, equivalent to 1 g of African yam bean flour to 4 g of honey, to get the paste which was administered after ulcer induction. Thirty adult male Wistar rats were randomly assigned to six groups (n = 5). The normal group received normal rat chow and water only. Gastric ulcer was induced in the ulcer- designated groups by a single oral administration of diclofenac potassium (50 mg/kg body weight). Following ulcer induction, the ulcer- induced control group received normal rat chow and water only while the standard treatment group received omeprazole at 20 mg/ kg body weight once daily by oral gavage. The three treatment groups received SAYBHP doses of 500, 1000 and 1500 mg/kg body weight, respectively, by oral gavage for 21 days. Normal saline was used as the vehicle at a dose volume of 10 ml/ kg body weight. At the end of the treatment period, gastric ulcer index, percentage ulcer healing, gastric pH and gastric volume were determined. Data were analysed using Statistical Package for the Social Sciences (SPSS) version 20, and statistical significance was set at $p < 0.05$.

**RESULTS AND DISCUSSIONS:** Administration of diclofenac significantly increased ulcer index and gastric volume while reducing gastric pH compared with the normal control ($p < 0.05$). Administration of SAYBHP significantly reduced ulcer index and improved gastric pH in treated groups compared with the untreated ulcer group. The 1000 and 1500 mg/kg treatment groups achieved complete (100%) ulcer healing, whereas the 500 mg/kg group recorded 95.82% ulcer healing. Gastric volume was also significantly reduced in the treatment groups.

**Table 1: Mean ulcerative index, pH values, gastric volume and percentage curation of ulcer of the rats**

| Groups | Ulcer Index | pH | Gastric volume (ml) | % curation |
|---|---|---|---|---|
| **NOR** | $0.00^{a} \pm 0.0$ | $4.60^{b} \pm 1.0$ | $0.86^{ab} \pm 0.48$ | _ |
| **IND** | $11.99^{b} \pm 4.0$ | $3.00^{a} \pm 0.3$ | $1.18^{b} \pm 0.49$ | 0 |
| **STD** | $1.05^{a} \pm 0.0$ | $5.10^{b} \pm 0.46$ | $0.66^{a} \pm 0.23$ | 91.24 |
| **SAYBHP$_{500}$** | $0.50^{a} \pm 0.0$ | $4.70^{b} \pm 1.0$ | $0.40^{a} \pm 0.2$ | 95.82 |
| **SAYBHP$_{1000}$** | $0.00^{a} \pm 0.0$ | $5.90^{b} \pm 0.42$ | $0.58^{a} \pm 0.30$ | 100 |

| | | | | |
|---|---|---|---|---|
| **SAYBHP$_{1500}$** | $0.00^{a}$ ±0.0 | $5.10^{b}$ ±0.28 | $0.70^{ab}$± 0.30 | 100 |

Values are expressed as means± SD of each rat group (n=5). Mean values with the same superscripts were not significant ($p>0.05$) while those that were different were statistically significant ($p<0.05$) across the column. Baseline= after induction, end value= after treatment, NOR: non-ulcer rats, IND: ulcer induced rats without treatment, STD: ulcer induce rats treated with standard drug, SAYBHP$_{500}$: ulcer induced rats treated with 500mg/kg SAYBHP, SAYBHP$_{1000}$: ulcer induced rats treated with 1000mg/kg SAYHBP and SAYBHP$_{1500}$: ulcer induced rats treated with 1500mg/kg SAYBHP.

**CONCLUSION AND RECOMMENDATIONS:** Honey reduced ulceration by antioxidant action. African yam bean phenolics enhanced prostaglandin production.The combination restored gastric mucus.The paste inhibited gastric acid secretion.The effect is equivalent to or better than the conventional anti-ulcer drug. Further studies are recommended to ascertain its mechanism of action and evaluate its clinical efficacy in humans.

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**Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

# Dietary Adherence and Attitudes Towards Nutrition Teleconsultation Among Adults with Type 2 Diabetes Mellitus in Ekiti State, Nigeria

*Olowolafe, B.O.[1], Ajayi, K.[1], Tanimonure A.M[1] and Alebiosu, I.[1]
[1]Department of Nutrition and Dietetics, Afe Babalola University, Ado-Ekiti
*Corresponding author, e-mail: ajayikayode@abuad.edu.ng , +2348066287477

**Keywords:** Dietary adherence; Nutrition teleconsultation; Type 2 diabetes; Technology Acceptance Model

## Highlights

- Participants showed moderate-to-high dietary adherence
- Perceived usefulness was the highest-rated TAM construct but did not predict behavioural intention.
- Attitudes towards teleconsultation were favourable

**BACKGROUND AND OBJECTIVES:**
Type 2 Diabetes Mellitus (T2DM) prevalence continues to rise in Nigeria. Connecting sectors of the health system is important to sustain nutrition care in chronic conditions. Dietary adherence remains central to glycaemic control yet constrained by economic, cultural, and health-system barriers, including limited access to hospital-based dietetic counselling. Nutrition teleconsultation offers a way of connecting nutrition and digital-health sectors to extend dietitian access beyond scheduled visits. However, Nigerian evidence linking dietary adherence with patient readiness to adopt such care remains scarce, particularly in Ekiti State, which carries a documented, under-diagnosed diabetes burden. This study assessed dietary adherence and attitudes of adults with T2DM towards adopting nutrition teleconsultation, using the Technology Acceptance Model (TAM), as a tool connecting nutrition, health-system, and digital-sector delivery of dietary management.

**MATERIALS AND METHOD:**
A concurrent mixed-methods design was adopted at two hospitals in Ekiti State (EKSUTH and AMSH). Sixty-five (65) adults with T2DM were recruited via stratified proportional sampling (Yamane formula); fifteen (15) participants were purposively selected for qualitative interviews until saturation. Dietary adherence was measured using an adapted 9-item Perceived Dietary Adherence Questionnaire (PDAQ); attitudes towards teleconsultation were measured using an adapted TAM instrument (PU, PEOU, ATU, BI). Quantitative data were analysed via descriptive statistics, correlation, and multiple regression in R; qualitative data were analysed thematically.

**RESULTS AND DISCUSSION:**
Participants had a mean age of 58.2 ± 14.3 years, and 69.2% were female. Mean overall PDAQ score was 35.12 ± 5.93 (range: 17–44), indicating moderate-to-high dietary adherence; adherence was highest for avoiding sugary foods/drinks (83.1%) and lowest for fruit inclusion (38.5%), linked qualitatively to cost and accessibility. TAM construct means were favourable (PU = 4.21,

PEOU = 3.97, ATU = 4.21, BI = 4.05; 5-point scale). Regression showed ATU ($\beta = 0.541$, $p < 0.001$) and PEOU ($\beta = 0.327$, $p < 0.001$) as significant predictors of BI, while PU was not significant ($\beta = -0.042$, $p = 0.696$), with the model explaining 74.9% of variance in adoption intention (Table 1), consistent with TAM's proposition that usefulness acts indirectly through attitude.

**Table 1: Multiple regression predicting Behavioural Intention to adopt nutrition teleconsultation (N = 65)**

| Predictor | β | t | p-value |
|---|---|---|---|
| Attitude Toward Use (ATU) | 0.541 | 6.02 | <0.001 |
| Perceived Ease of Use (PEOU) | 0.327 | 3.64 | <0.001 |
| Perceived Usefulness (PU) | -0.042 | -0.39 | 0.696 |

*Model: $R^2 = 0.749$, Adjusted $R^2 = 0.736$, $F(3,61) = 60.56$, $p < 0.001$*

**CONCLUSION AND RECOMMENDATION(S):** Adults with T2DM in this study showed moderate-to-high dietary adherence alongside favourable attitudes toward adopting nutrition teleconsultation, driven primarily by attitude and ease of use rather than usefulness alone. Delivering better nutrition here means connecting health and digital sectors deliberately: teleconsultation should prioritise low-bandwidth, user-friendly formats (e.g., phone-call or WhatsApp-based counselling), with hospital dietetic units exploring structured teleconsultation as a cross-sectoral complement to in-person counselling.

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**Theme:** Innovations in Clinical Nutrition Practice Across the Life cycle: Aligning Evidence-based Protocols with Health System Delivery

**Title:** Quality and Effectiveness of Food Demonstration Sessions in Primary Health Facilities in Three Urban Local Government Area of Ibadan, Oyo State

**Name of Author(s):** *Fakorede, B.A.[1], And Ariyo, S. [2]

**Affiliation of Authors**: [1]Department of Human Nutrition and Dietetics, University of Ibadan.

**Email addresses and Phone number**: *fakoredeadeola18@gmail.com+2348123221239

**Keywords:** Food demonstration, Quality, Effectiveness, Primary health facility

**Highlights**

- Non-availability of essential resources for food demonstration sessions in PHCs.
- Food demonstrations improved caregivers'capacity to prepare healthy meals for children
- There are still gaps and distractions during the food demonstration sessions

**BACKGROUND AND OBJECTIVES:**

Food demonstration is an effective way to interact with vulnerable groups to promote healthier dietary profiles in primary health care system. Poor dietary practices remain the major bedrock of escalating burden of malnutrition[1]. Among children, poor feeding practices is characterized by poor compliance to recommended maternal, infant and young child feeding practices such as early initiation of breast milk [2]. The purpose of this study is to evaluate the practice, quality and effectiveness of food demonstration sessions conducted around primary health facilities in three urban local government areas of Ibadan.

**MATERIALS AND METHOD:**

The study design is a descriptive cross-sectional quantitative approach. Using an interview-administered questionnaire, the study was conducted in primary health facilities in 3 urban local government areas of Ibadan, Oyo state, Nigeria among Nursing mothers with their children aged 6-23 months and health workers. To summarize and show data, descriptive statistical analysis was done using IBM SPSS version 28.

**RESULTS AND DISCUSSION:**

The study was able to show that only ten health facilities conduct food demonstration session across three urban local Government areas, the cadres of staff members in charge of nutrition services included Nurses, community health workers. Majority of the health facility lack dedicated nutrition experts. Result showed a significant non-availability of essential resources in primary health facilities needed the food demonstration sessions and there are still areas of gaps in the areas of distractions of the facilitators during the sessions, lack of posters, facilitators guide and writing materials for the caregivers. More than half (97.1%) of individuals believed that their participation food demonstration enhanced their capacity to make healthy meals for their children. Notably, 70.5% of the participants have the likelihood of attending future food demonstration sessions.

## CONCLUSION AND RECOMMENDATION:

The quality and effectiveness were positive but the practice of food demonstration was poor. Many health workers reported lack of resources and staffing issues, no support from the government. There is a need for positive nutrition professionals in primary health facilities. Also, the need to address staffing issues to allow professionals handle the food demonstration sessions and providing resources such as Nigeria's food demonstration recipe handouts, posters and charts to enable audience follow along during the sessions. Additionally, participants emphasized the need to promote the food demonstration sessions through media, ensuring regularity and providing a conducive environment for learning.

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**Sub-Theme**: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Metabolic and Anthropometric Responses to a Ketogenic African Walnut (*Tetracarpidium conophorum*)-based Diet in Overweight and Obese Nigerian Adults: A Community-Based Study

**Names of Authors**: *Ogbonnaya, F.C.[1], Shokunbi, O.S.[1], Anyasor, G.N.[1] and Nwachukwu, I.D. [2]

**Affiliation of Authors:** [1]Department of Biochemistry, Babcock University, Ogun State
[2] Department of Public and Allied Health, Bowling Green State University, Bowling Green, OH 43403, USA
*faithogbonnaya@gmail.com, +2347032365117

**Keywords:** African walnut-based diet, Anthropometric response, Ketogenic diet, Overnutrition

**Highlights: -** Ketogenic diet reduces resting metabolic rate of overweight and obese adults.

- African walnut-based diet yields weight loss among overweight and obese adults.

**BACKGROUND AND OBJECTIVE:**
Excessive weight gain, has been a leading risk factor to non-communicable diseases and related mortality in sub-Saharan countries like Nigeria, due to nutrition transition and increased sedentary lifestyle [1]. African walnut (*Tetracarpidium conophorum*), a non-allergenic nut widely consumed as snacks for its health benefit, albeit with limited scientific reports on its effect on the weight of Nigerian adults [2]. Therefore, this study investigated the effect of African walnut-based diet on selected metabolic and anthropometric parameters of free-living overweight and obese adults in Ikenne LGA, Ogun State.

**MATERIALS AND METHOD:**
This study is a subset of clinical trial on the effect of African walnut nut-based diet on cardiometabolic health of overweight and obese Nigerian adults. A double parallel clinical trial on 72 overweight and obese adults' study was carried out over 24 weeks in two phases of 12 weeks each. The volunteers were randomly assigned into two groups of 36 volunteers each. In the first phase, participants in the two groups were fed hypocaloric diets (25% less than daily calorie requirement). In addition, the diets of the treatment group were ketogenic with 25% of the calorie derived from African walnut. The resting metabolic rate (RMR), weight, body mass index (BMI) and waist-to-hip ratio (WC/HC) at weeks 0 (Baseline), 12 (midline) and 24 (endline) were collected from all participants. Data were analyzed using paired *t*-test and significant difference was determined at $p < 0.05$.

**RESULTS AND DISCUSSION:**

There was a significant decrease in the means of RMR in the treatment group when baseline was compared with midline and endline whereas the weight was significantly decreased when the baseline data was compared with the midline and endline data in both groups as shown in Figures 1 and 2 below respectively. The RMR reduction was due to general reduction in body size which may yield a lower cardiometabolic risk as previously established [3]. The weight loss could be attributed to the hypocaloric and high fiber diets consumed over the period [4].

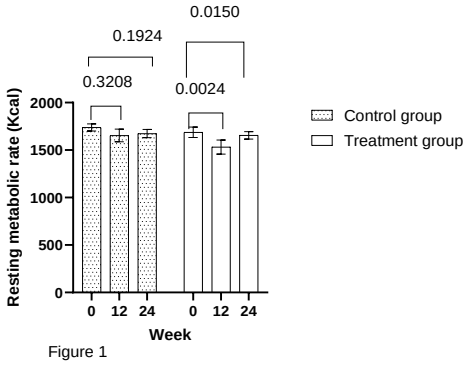


Figure 1

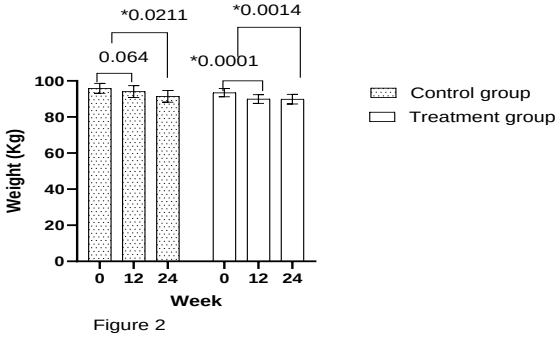


Figure 2

**Figure 1** – The effect of African walnut-based ketogenic diet on RMR of participants;

**Figure 2** – The effect of African walnut-based ketogenic diet on weight of participants

## CONCLUSION AND RECOMMENDATION:

African walnut-based diet improved health of free-living overweight and obese Nigerian adults by reducing their RMR, weight and by extension BMI. Copious consumption of African walnut beyond snacking is therefore encouraged among overweight and obese adults to optimize the health benefits it may confer.

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**Sub-Theme**: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Effect of a Hypocaloric African Walnut-Based Diet on Lipid Profile of Free-Living Overweight and Obese Adults

**Names of Authors**: Ogbonnaya, F.C.[1], *Shokunbi, O.S.[1], Anyasor, G.N.[1], and Nwachukwu, I.D.[2]

**Affiliation of Authors:** [1]Department of Biochemistry, Babcock University, Ogun State
[2] Department of Public and Allied Health, Bowling Green State University, Bowling Green, OH 43403, USA
*osshokunbi@gmail.com, +2348030689633

**Keywords:** African walnut-based diet, Cardiovascular disease, Hypocaloric, Overnutrition

**Highlights: -** Consumption of African walnut-based diet is beneficial to heart health of adults.

- African walnut-based diet yields reduction in HDL-C and HDL-C/LDL-C among adults.

**BACKGROUND AND OBJECTIVE:** Overweight and obesity are strongly linked to sedentary lifestyle and are major risk factors to cardiovascular diseases [1]. African walnut, a non-allergenic nut has been widely promoted for cardiovascular health, but with limited scientific evidence [2]. Thus, this study evaluated the effect of the walnut-based high-fat diet on the lipid profile of overweight and obese Nigerian adults.

**MATERIALS AND METHODS:** This study is a subset of clinical trial on the effect of African walnut nut-based diet on cardiometabolic health of overweight and obese Nigerian adults. A double parallel clinical trial on 72 overweight and obese adults' study was carried out over 24 weeks in two phases of 12 weeks each. The volunteers were randomly assigned into two groups of 36 individuals each. In the first phase, participants in the two groups were fed hypocaloric diets (25% less than daily calorie requirement). In addition, the diets of the treatment group were ketogenic with 25% of the calorie being derived from African walnut. The lipid profile of participants was evaluated via standard laboratory kits, after blood collection at weeks 0 (Baseline), 12 (midline) and 24 (endline). Results were analyzed using paired *t*-test and significant difference was determined at $p < 0.05$.

**RESULTS AND DISCUSSION:**

The high-density lipoprotein cholesterol (HDL-C) increased in the control group (58.28%, 74.32%) and in the treatment group (47.40%, 84.6%) in phase 1 and phase two respectively. and HDL-C/low-density lipoprotein cholesterol (LDL-C) were significantly increased in the control group (108.54%, 284.20%) and in the treatment group (126.94%, 188.57%) in phase 1 and phase 1 respectively, as shown in Figures 1 and 2. This shows that African walnut increased HDL-C/LDL-C by reducing LDL-C. The increased ratio at the end of phase 2 in both groups shows that

the fiber content in the diet also contributed to the observed effects recorded earlier. This agrees with the report that intake of hypocaloric diet improves lipid profile [3,4].

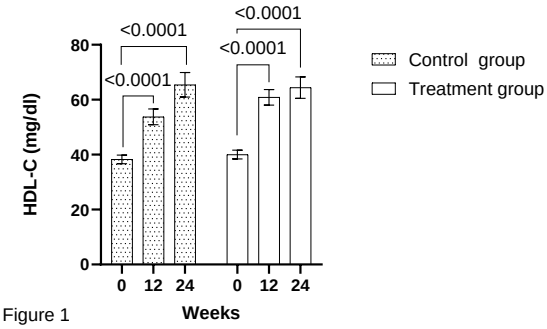



Figure 1

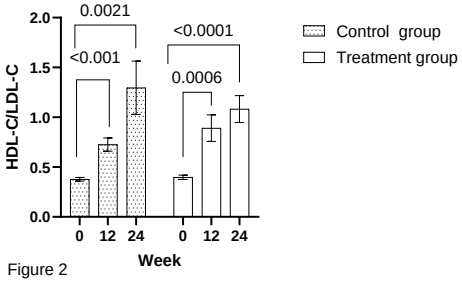



Figure 2

**Figure 1** – The effect of African walnut-based ketogenic diet on HDL-C of participants;
**Figure 2** – The effect of African walnut-based ketogenic diet on HDL-C/LDL-C of participants

**CONCLUSION AND RECOMMENDATION**:

The African walnut-based diet improved lipid profiles, specifically by raising HDL-C and enhancing the HDL-C/LDL-C ratio among overweight and obese Nigerian adults. Thus, regular consumption of the nut is highly recommended to optimize lipid profiles and reduce cardiovascular disease risk in overweight and obese populations.

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**Sub-Theme**: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title**: Invitro Antioxidant Activity of Indigenous Formulated Legume Pastes for Malnourished Children.

**Authors**: *Akanbi A.A.[1], Obode O.C.[1], Oladunmoye F.[1], Kayode O.F.[2], Adeyilola O.D.[1], Silas A.[1]

**Affiliation of Authors**: [1]Food Technology Department, Federal Institute of Industrial Research, Oshodi, Lagos (FIIRO)

[2]Production, Analytical & Labouratory Management Department; FIIRO

*Corresponding author, email: adeolatinuke@gmail.com, +2348034190027

**Keywords**: Malnutrition, Legume-based paste, Antioxidant activity

**Highlights**

- HERO-G and HERO-S pastes showed dose-dependent DPPH radical scavenging
- HERO-S had higher antioxidant activity than HERO-G across all assays
- Both pastes inhibited lipid peroxidation, indicating antioxidant potential

## BACKGROUND AND OBJECTIVES

Severe acute malnutrition (SAM) is a major cause of illness and death in children under five in low- and middle-income countries [1]. Malnourished children also experience elevated oxidative stress, which worsens tissue damage and slows recovery [2]. Plumpy Nut (imported) has addressed SAM in Sub-Saharan Africa but remains grossly inaccessible [3]. However, indigenously formulated groundnut and soybean pastes offer an affordable, nutrient-rich alternative containing antioxidant phytochemicals (isoflavones, phenolic acids, flavonoids) that restore redox balance. This study evaluated the in vitro antioxidant activity of two FIIRO-developed legume pastes, HERO-G (groundnut) and HERO-S (soybean).

## MATERIALS AND METHODS

HERO-G and HERO-S pastes, formulated at FIIRO using groundnut or soybean as the primary protein source, combined with yellow maize, full-fat milk, Vitamin A-fortified sugar, vegetable oil, iodized salt, and a vitamin-mineral premix. In vitro antioxidant capacity was assessed by 2,2-diphenyl-1-picrylhydrazyl **(**DPPH) radical scavenging, Ferric antioxidant power (FRAP), and lipid peroxidation inhibition assays, using ascorbic acid and gallic acid as reference standards. DPPH radical scavenging activity was determined at four concentrations (25, 50, 75, and 100 µg/mL), with absorbance measured at 517 nm. Data were analyzed using a Completely Randomized Design (CRD), and means were separated using the Tukey-Kramer post-hoc test at $p < 0.05$.

## RESULTS AND DISCUSSION

Figure 1 illustrates the dose-dependent DPPH radical scavenging activity of the pastes across concentrations of 25–100 µg/mL, with no significant difference ($p > 0.05$) observed across doses within either product, as determined by Tukey-Kramer post-hoc test. HERO-S exhibited significantly higher scavenging activity than HERO-G at all four concentrations tested ($p < 0.05$),

consistent with soybean's higher isoflavone and phenolic compound content [4]. Both products demonstrated lipid peroxidation inhibitory effects, supporting their potential to counteract oxidative stress, a key pathophysiological driver of poor recovery in malnourished children. However, reference antioxidants (ascorbic and gallic acids) showed higher inhibitory activity than both pastes.

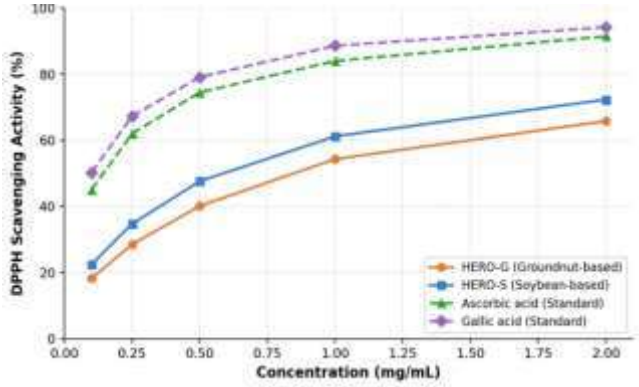



**Figure 1: DPPH Radical Scavenging Activity of HERO-G and HERO-S Pastes**

## CONCLUSION AND RECOMMENDATION

The FIIRO-developed legume-based pastes demonstrated significant antioxidant activity, with HERO-S outperforming HERO-G, suggesting their potential as affordable, locally produced therapeutic foods for managing childhood malnutrition and oxidative stress-related conditions. Further in vivo and clinical studies are recommended to confirm their antioxidant efficacy, nutritional adequacy, safety, and suitability for use in the management of childhood malnutrition.

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**Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Mapping of Nutrition Services and Competencies at Military Health Facilities in Nigeria

**Authors:** Kasumu, M. F.[1], Ejoh, S. I.[1], Manawa, O.[1], Makinde, J. O.[1], Folasire, O. F.[1], Ajibade, C. A.[1], Oladejo, E. O.[1], and Ariyo, O.[1]

**Affiliation of authors:** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo State, Nigeria

***Corresponding author:** cornellajibade@gmail.com, +2348162188767

**Keywords:** Military Hospital, Nutrition Service Delivery, Human Resources, Quality Improvement

**Highlights**

- Only 45.5% of MHFs offered nutrition services; 39.6% had a nutritionist
- Human resource capacity was poor in 75.2% of facilities
- Only 37.6% of facilities analysed nutrition data for decision-making

**BACKGROUND AND OBJECTIVES**: Military Health Facilities (MHFs) deliver preventive, promotive, and curative healthcare to personnel, dependents, and surrounding civilian populations, yet nutrition service delivery within Nigeria's MHFs remains poorly documented [1]. Military families face heightened vulnerability to food insecurity, with about one in four active-duty households affected, alongside elevated spousal unemployment and associated risks of mental health challenges and micronutrient deficiencies [2]. This study assessed the capacity and delivery of nutrition services across military health facilities in Nigeria, examining human resource capacity, service provision, community linkages, and quality-improvement mechanisms.

**METHODS:** A descriptive cross-sectional study was conducted among Officers-in-Charge of Military Health Facilities across Nigeria's six geopolitical zones. All 150 MHFs nationwide were purposively targeted using total sampling; 101 facilities completed the study (67.3% response rate). Data were collected using a semi-structured questionnaire (based on the Uganda Nutrition Service Delivery Assessment Tool), direct observation, and interviews with Officers-in-Charge. Capacity was evaluated across 11 domains and categorised as poor, fair, good, or excellent based on pre-defined criteria. Data were analysed using descriptive statistics on SPSS 26.0.

**RESULTS AND DISCUSSION**: Of the 101 sampled military health facilities, only 45.5% offered nutrition services and 39.6% had a nutritionist or dietitian, with human resource capacity rated poor in 75.2% of facilities. Facilities performed strongly in basic service provision (54.4% good, 42.6% excellent): weight assessment (99.0%) and referral (97.0%) were near-universal, but specialised services lagged, including MUAC measurement (42.6%), therapeutic feeding (29.7%), and follow-up (66.3%). Quality-improvement systems were poor in 65.3% of facilities, with only about a third having a functional QI team. Community linkages were largely fair (62.4%): most

facilities (86.1%) were linked with community health workers, yet only 42.6% received client referrals from the community. Monitoring and evaluation was similarly weak (58.4% poor): although 86.1% had a designated HMIS officer, only 37.6% analysed or displayed nutrition data for decisions. This pattern, in which strong basic service delivery coexists with weak workforce and data-use systems, points to systemic underinvestment in the enabling environment rather than frontline unwillingness.

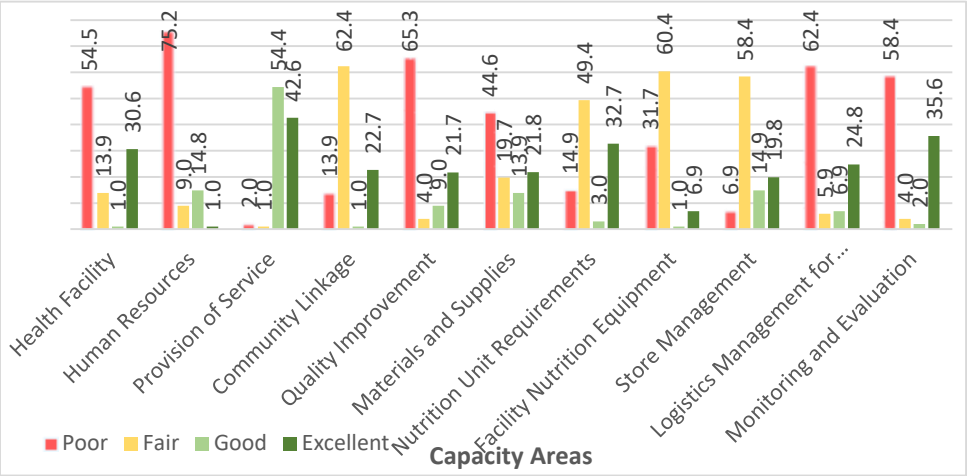



**Figure: Overall Facility Capacity Classification by Domain (N = 101)**

**CONCLUSION AND RECOMMENDATION(S)**: Nigerian military health facilities show strong performance in basic nutrition service delivery but face substantial gaps in workforce training, quality-improvement systems, and monitoring and evaluation. Strengthening nutrition service delivery will require coordinated investment in nutrition workforce training, functional quality-improvement structures, and routine data use, alongside stronger community-facility referral linkages.

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**Theme/sub-theme:** **Clinical Nutrition Innovation**

**Title:** **Effects of intermittent fasting on the kidney and pancreas of streptozotocin-induced rats on a high-fat diet: oxidative stress, renal biomarkers, and histopathological changes**

**Name of Authors:** Akinlade A.R.[1], *Oyebamiji E.A.[2], Onifade O.M.[3], Fabusoro O.K.[4]

**Affiliation of Author:** [1]Babcock University, Human Nutrition and Dietetics, Ilishan-Remo, Nigeria,
[2]University of Ibadan, Department of Human Nutrition and Dietetics, Ibadan, Nigeria,
[3]University of Newcastle, School of Medicine and Public Health, College of Health, Medicine and Wellbeing, Newcastle, Australia,
[4]University of Illinois, Urbana-Champaign, Department of Agriculture and Nutrition Science, Cedar City, UT, United States of America
*Corresponding author: oyebamijiemmanuel@gmail.com, +234 816 418 1872

**Keywords:** Intermittent fasting; streptozotocin; high fat diet; oxidative stress

**Highlights**

- The 5:2 diet showed the greatest glycaemic reduction and pancreatic recovery in diabetic rats.
- Alternate-day fasting provided the best renal protection with normalised creatinine levels.
- All Intermittent fasting protocols reduced lipid peroxidation

**BACKGROUND AND OBJECTİVES:**

Intermittent fasting (IF) has gained increasing attention as a nonpharmacological dietary strategy for managing diabetes mellitus and its metabolic sequelae. However, its specific effects on the kidney and pancreas, critically implicated in diabetes pathology, remain inadequately characterised in the context of high-fat diet (HFD) fed, streptozotocin (STZ) induced diabetic rats. This study investigated the effects of IF regimens on oxidative stress indices, renal function biomarkers, and histopathological changes in the kidney and pancreas of STZ-induced Wistar rats maintained on an HFD.

**MATERIALS AND METHODS:**

Fifty male Wistar rats (90–120 g) were randomly assigned to five groups (n = 10): Group 1 (control), Group 2 (STZ induced diabetic, no IF), Group 3 (STZ + TRF: 16h fast, 8h feeding), Group 4 (STZ + ADF: alternate day fasting), and Group 5 (STZ + 5:2 diet). Diabetes was induced

by a single intraperitoneal injection of STZ (50 mg/kg) on day 14, after two weeks on HFD supplemented with butter (70:30 ratio).

**RESULTS AND DISCUSSION:**

Blood glucose declined significantly in Groups 2 (104.0 ± 10.23 to 63.3 mg/dL) and 5 (93.8 ± 6.65 to 42.8 ± 4.72 mg/dL) during IF treatment. All IF groups showed reduced antioxidant enzyme activity (catalase and SOD) relative to control, with Group 5 demonstrating the lowest MDA concentration (0.05 ± 0.05), suggesting attenuation of lipid peroxidation. Group 5 had the lowest urea (1.43 mg/dL), while Group 5 recorded the highest creatinine (86.75 ± 58.28 mg/dL). Kidney histology showed inflammatory cell infiltration, tubular dilation, and necrosis in the IF groups, with Group 5 showing near-normal glomerular morphology. Pancreatic histopathology revealed islet degeneration and vacuolation in Groups 3 and 4, with Group 5 demonstrating islet regeneration. Time-restricted feeding has generally shown more modest glucose benefits in short-duration animal studies [1,2]. All diabetic groups exhibited reduced catalase and SOD activity compared to the control, consistent with the well-documented STZ-induced suppression of antioxidant defences [3].

**CONCLUSION AND RECOMMENDATİON:**

Alternate-day fasting showed the greatest renal protection, as evidenced by creatinine normalisation. Implementing alternate-day fasting (ADF) may provide significant renal protection and attenuation of oxidative stress in diabetic conditions, suggesting that ADF could be considered a beneficial dietary strategy for managing diabetes-related renal complications.

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**Sub-theme: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery**

# Title: Pneumococcal Conjugate Vaccine Uptake and Nutritional Status among Under-Five Children Attending Aminu Kano Teaching Hospital, Kano State, Nigeria: A Cross-Sectional Study

**Muhammad M. Mukhtar[1]*, Aisha H. Bala[1], and Amina Shehu[1]**

[1] Department of Biochemistry, Bayero University Kano, Kano, Nigeria

* Corresponding author: Muhammad Mahe Mukhtar, Department of Biochemistry, Bayero University Kano, Kano, Nigeria.mmmukhtar.bch@buk.edu.ng, +2348164715941

Running title: PCV uptake and child nutrition in Kano

**Keywords:** Pneumococcal conjugate vaccine; Nutritional status; Under-five children

**Highlights:**

- Complete Pneumococcal Conjugate Vaccine (PCV) uptake was significantly associated with better nutritional status among under-five children.
- Completion of PCV schedule declined progressively from the first to third vaccine dose.
- Integrating routine immunization with nutrition services could improve child health outcomes.

**Introduction:** Pneumococcal disease and undernutrition remain major, interacting child-health problems in Nigeria. National survey data reported stunting, underweight and wasting in 36.8%, 24.2% and 6.8% of children under five years, respectively, with marked regional disparities in northern Nigeria [1]. Nigerian studies have demonstrated its immunogenicity and population-level effect on pneumococcal carriage [2]. However, the relationship between PCV uptake and child nutritional status remains insufficiently described, despite evidence that undernutrition may alter vaccine-induced immunity.

**Aim/Objectives:** This study determined PCV uptake and assessed the association between PCV vaccination status and nutritional status among children aged 6–59 months attending Aminu Kano Teaching Hospital (AKTH), Kano, Nigeria.

**Methodology:** A hospital-based analytical cross-sectional study was conducted among 171 children aged 6–59 months attending the Immunization Clinic and Paediatric Outpatient Department of Aminu Kano Teaching Hospital, Kano State. Vaccination cards were reviewed to verify PCV vaccination status, while anthropometric measurements were obtained using standard World Health Organization procedures [3]. Nutritional status was determined using WHO Anthro software. Data were analysed using SPSS version 25. Descriptive statistics summarized participants' characteristics.

**Results:** Vaccination records showed that 88.9% received PCV1, 74.3% received PCV2, and 56.1% received PCV3, demonstrating a progressive decline in completion of the recommended vaccination schedule. Nutritional assessment revealed that 60.8% of the children had normal nutritional status, while 21.6% were stunted, 11.1% were underweight, and 6.4% were wasted.

**Table 1: PCV Uptake and Nutritional Status**

| Indicator | Frequency (n) | Percentage (%) | 95% CI |
|---|---|---|---|
| PCV1 received | 152 | 88.9 | 83.3 – 92.8 |
| PCV2 received | 127 | 74.3 | 67.2 – 80.2 |
| PCV3 received | 96 | 56.1 | 48.6 – 63.4 |
| Normal nutritional status | 104 | 60.8 | 53.3 – 67.8 |
| Stunted | 37 | 21.6 | 16.1 – 28.4 |
| Underweight | 19 | 11.1 | 7.2 – 16.7 |
| Wasted | 11 | 6.4 | 3.6 – 11.2 |

**Conclusion:** Full vaccination was strongly associated with normal nutritional status. The association does not establish causality but supports closer integration of routine immunization and child-nutrition surveillance. Health facilities should use immunization contacts to screen, track and refer children with growth faltering for nutrition assessment.

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**Sub-theme:** Innovation in clinical practice across the life cycle

**Title:** Integrating the use of food composition tables/databases in determining post-prandial blood glucose response to under-utilized cocoyam *(Xanthosoma mafaffa*)-based traditional diets

**Name of Author(s): ***Udenta, E. A.,[1] Unegbu, A. R.,[1] Ayogu, R. N. B.[1] and Chikwendu J. N. [1]

Affiliation of Author (s): Department of Nutrition and Dietetics, University of Nigeria, Nsukka.

**Email and phone number of *Corresponding author: elizabeth.udenta@unn.edu.ng** +234 (0) 8035974501

**Keywords:** Blood glucose control, cocoyam, traditional dishes, post-prandial glucose estimation

**Highlights:**

- The under-ulitilized cocoyam-based traditional diets studied showed potentials for control of post prandial rise of blood glucose.
- Use of food composition tables/databases in estimating the dietary fibre and available carbohydrate components of traditional food ingredients/diets for post prandial blood glucose determination served as a reliable alternative method to the expensive enzymatic analysis of the two relevant parameters

**BACKGROUND AND OBJECTIVE:** Post-prandial blood glucose is the primary step in measuring how fast and how high glucose rises as the body digests foods. It is used primary in determination of glycaemic index (GI), a scale that classifies foods based on their effects on blood glucose. The high cost of enzymatic dietary fibre analysis, widely accepted as the golden method in blood glucose response (BGR) and GI estimation poses a big challenge to provision of evidence-based food data generation that will accelerate the development of GI Table of rich Nigerian traditional diets. Use of food composition tables/databases is an indirect and cost-effective method of estimating food constituents in clinical practice. This study aimed to integrate the use of food composition table in determining the post-prandial BGR of under-utilized cocoyam-based traditional dishes.

**MATERIALS AND METHOD:** The cocoyam was obtained from rural farmers in Owerri, Imo state. Focus group discussion was used to generate recipes on the cocoyam-based dishes. Three dishes (boiled cocoyam with palm-oil sauce, BCS; pounded cocoyam with 'oha' (African rosewood leaves) soup, PCS; cocoyam 'fufu', a smooth dough-like paste, with 'oha' soup, FCS) were selected, prepared and subjected to proximate analysis using standard methods. The dietary fibre and available carbohydrate composition of the ingredients for the dishes were estimated using the food composition tables/databases. Ten (10) normoglycaemic human subjects (21-24 years) with normal body mass index (20.82kg/$m^2$) were used for the feeding trial. The reference food (glucose) and varying quantities of the test meals that contain 50g of available carbohydrate were

fed to the subjects. Fasting blood glucose and post-prandial BGR were determined at 0, 30, 60, 90 and120 minutes. Data obtained were analyzed using Statistical Product and Service Solution (SPSS) version 23. Analysis of Variance (ANOVA) was used to compare means at 5% significant level ($p < 0.05$).

**RESULTS AND DISCUSSIONS:** All the dishes had similar values (82.00-90.83mg/dl) within the recommended target for normal 2-hour post-prandial blood glucose (<140 83mg/dl)) for non-diabetic individuals, but BCS dish had the least (82.00mg/dl). Its higher content of crude fibre and palm oil/100g (> 80% higher), would have contributed to the lower post-prandial blood glucose observed because the crude fibre and fat have been linked to slowing down the digestion and absorption of carbohydrate, leading to slower release of glucose into the bloodstream [1, 2].

**Table 1: Fasting Blood Sugar and Glycemic Response in mg/dl of Selected (*Xanthosoma mafaffa*)-based Traditional Dishes**

| Variety | *FBG | 30 minutes | 60 minutes | 90 minutes | 120 minutes |
|---|---|---|---|---|---|
| Reference Standard (Glucose) | $89.50^{b} \pm 15.78$ | $132.86^{b} \pm 13.86$ | $128.00^{b} \pm 19.71$ | $116.00^{b} \pm 10.58$ | $102.50^{b} \pm 10.53$ |
| Boiled *X. mafaffa*+ red oil sauce | $79.80^{a} \pm 5.19$ | $98.71^{a} \pm 17.50$ | $97.71^{a} \pm 15.88$ | $92.86^{a} \pm 8.67$ | $82.00^{a} \pm 13.24$ |
| **P*X. mafaffa*+with 'oha' soup | $81.20^{a} \pm 5.71$ | $104.83^{a} \pm 104.83$ | $96.67^{a} \pm 13.89$ | $92.33^{a} \pm 14.57$ | $90.83^{a} \pm 8.47$ |
| *X. mafaffa* fufu with 'oha' soup | $94.40^{b} \pm 17.70$ | $108.33^{a} \pm 108.33$ | $90.67^{a} \pm 12.94$ | $95.50^{a} \pm 14.01$ | $89.17^{a} \pm 12.14$ |

**Means with different superscripts in the same column are significantly different ($p < 0.05$) while simiilarity in superscript down the column indicates a non- significant difference at $p \geq 0.05$. Values are means ± standard deviation (SD) for 10 subjects. *FBG = Fasting Blood Glucose; ** PX. = Pounded X. mafaffa**

**CONCLUSION AND RECOMMENDATION (S):** Use of food composition tables/databases for estimating dietary fibre and available carbohydrate of traditional foods aided the application of standard procedures for determination of post-prandial blood glucose response to foods. The test diets did not increase the 2-hour post-prandial blood glucose and their consumption should be encouraged through nutrition education. More researches should be done using this affordable method for wider application and uniformity in generating food data for glycaemic control.

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**Sub- theme: Innovation in Clinical Nutrition Practice Across the life Cycle Life Cycle: Aligning Evidence – Based Protocols with Health System Delivery**

# Estimated Daily Intake (EDI) and Target Hazard Quotient (THQ) of Essential and Toxic Elements in Commercial Baby Foods Sold in Gwale Local Government Area, Kano State Nigeria

**AJ Alhaasan[1*], MA Dangambo[1] and Amatullah Ahmad[1]**
**[1]Department of Biochemistry, Faculty of Basic Medical Science College of Health Science, Bayero University, Kano**
**[*] Corresponding Author: ajalhassan.bch@buk.edu.ng**

**Key words:** Infant foods; Heavy metals; Risk assessment; Mineral elements

## Highlights

- The results showed that the EDI for cadmium and lead, exceeded their provisional tolerable daily intake (PTDI) in all baby food samples.
- Essential minerals (calcium, iron, and potassium**)** were below the recommended dietary allowance (RDA), while sodium levels were excessive.
- Lead cancer risk exceeded acceptable safety limits

**Background and Objective:**

Infants are exceptionally vulnerable to contaminants like heavy metals due to high intestinal absorption rates and high food consumption relative to their body weight (WHO, 2023). Lead (Pb) and cadmium (Cd) are toxic even at low concentrations, accumulating in the body over time and causing permanent brain damage, reduced IQ, and organ failure (Henriquez-Hernandez *et al*., 2023).

**Materials and Methods:** The methodology involved several key steps:

- **Sample Digestion:** samples were ashed in a muffle furnace at 550°C for 3hrs, dissolved using HCl and $HNO_3$ acids until white fumes were observed.
- **Analysis:** The concentrations of the metals were determined using **AAS** (Paul *et al*., 2014).
- **Health Risk Assessment:** three primary indices were calculated (Paul *et al*., 2014):
    1. **EDI:** PTDI for toxic metals and RDA for essential minerals.
    2. **THQ:** Used to assess potential **non-carcinogenic** health risks.
    3. **ECR:** Calculated specifically for lead using the cancer slope factor.

**Results and Discussion:**

- **Toxic Metal Risks:** Both lead and cadmium exceeded the PTDI in the samples. Lead mimics calcium and stores itself in the skeletal system, posing long-term neurodevelopmental risks. Cadmium, with a long half-life, poses a risk of **kidney damage**.
- **Nutritional Deficiencies:** iron, calcium, and potassium, were below the RDA. The critical low iron intake can lead to anemia and impaired cognitive development. Conversely, sodium levels were above the RDA, a concern due to infants' immature renal function.
- **Health Risk Indices:** The THQ values were generally below 1 (suggesting minimal acute non-carcinogenic risk), the Estimated Cancer Risk (ECR) for lead exceeded safe limits in all samples (Amerley *et al*., 2023).

**Table1: Concentration of elements (mg/100g), Estimated Daily Intake (mg/kg/day, Target Hazard Quotient and Estimated Cancer Risk of Baby foods in Kano, Gwale LGA, Kano**

| Sample ID | Element Type | Element Name | Concentration (r | Estimated Daily | Safety Referenc | Target Hazard Q | Estimated Canc | Safety Assessm |
|---|---|---|---|---|---|---|---|---|
| AA1 | Toxic | Lead | 0.238 | 0.041 | 0.0028 (PTDI) | 0.000595 | 0.0003485 | Excessive / Pote |
| AA2 | Toxic | Lead | 0.308 | 0.05300 | 0.0028 (PTDI) | 0.00077 | 0.0004505 | Excessive / Pote |
| AA3 | Toxic | Lead | 0.364 | 0.06262 | 0.0028 (PTDI) | 0.00091 | 0.00053227 | Excessive / Pote |
| AA1 | Toxic | Cadmium | 0.028 | 0.00482 | 0.000833 (PTDI | 0.00028 | Not in source | Excessive |
| AA2 | Toxic | Cadmium | 0.012 | 0.00264 | 0.000833 (PTDI | 0.00012 | Not in source | Excessive |
| AA1 | Toxic | Chromium | 0.056 | 0.009632 | 0.3 (PTDI) | 0.000167 | Not in source | Safe |
| AA3 | Essential | Manganese | 1.486 | 0.2556 | 0.7 (RDA) | 1.06 | Not in source | Potential Risk (T |
| AA1 | Essential | Calcium | 155.220 | 26.69784 | 64.5 (RDA) | Not in source | Not in source | Deficient |
| AA1 | Essential | Iron | 18.040 | 3.10288 | 10 (RDA) | Not in source | Not in source | Deficient |
| AA2 | Essential | Sodium | 82.340 | 14.167 | 4.6 (RDA) | Not in source | Not in source | Excessive |
| AA3 | Essential | Zinc | 4.992 | 0.8588 | 0.6 (RDA) | Not in source | Not in source | Safe/Acceptable |

**Conclusion:** Commercial baby foods sold in Gwale LGA contained elevated levels of lead and cadmium, while essential mineral concentrations were inadequate. Although THQ values suggested low immediate non-carcinogenic risk, elevated estimated cancer risk for lead indicates potential long-term health concerns for infants. Continuous surveillance and stricter quality control are therefore recommended.

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**SUBTHEME:** INNOVATIONS IN CLINICAL NUTRITION PRACTICE ACROSS THE LIFE CYCLE: ALIGNING EVIDENCE-BASED PROTOCOLS WITH HEALTH SYSTEM DELIVERY

**TITLE OF PAPER:** NUTRIENT ADEQUACY, MICROBIAL SAFETY, AND SHELF-LIFE OF BLENDERIZED DIETS IN COMPARISON WITH COMMERCIAL ENTERAL FORMULAS FOR ADULT AND PAEDIATRIC PATIENTS IN CRITICAL CARE

**NAME OF AUTHOR(S):** *Olorunbunmi A.P.[1,2], Efuntoye M.L.A.[1,2], Anueyiagu J.C.[2], Bolaji O.F.[2], Tijani B.O.[2], Arulogun T.W.[1]

**AFFILIATION OF AUTHOR(S):**

[1] *Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria.*

[2] *Nutrition and Dietetics Department, Lagos University Teaching Hospital, Idi-Araba, Lagos, Nigeria*

***CORRESPONDING AUTHOR:** olorunbunmianu@gmail.com

**KEYWORDS:** Blenderized fluid diet, Commercial enteral formula, Nutrient density, Microbial safety

**HIGHLIGHTS:**

- Hospital-prepared blenderized fluid diets (BFDs) provide an appropriate amount of calorie for tube feeding (0.82 kcal/mL for adults and 0.78 kcal/mL for children) and high amounts of whole-food protein (49.9 g/L for adults and 52.4 g/L for children), at a much lower cost than commercial enteral formulas (ENF).
- Commercial ENFs had higher fat content (25.3–37.5 g/L), calcium (1055–1167 mg/L), and potassium (1375–1560 mg/L), defining precise micronutrients for targeted fortification in BFDs.
- Mathematical growth modeling showed that refrigerated adult BFDs remain safe for up to 39 hours and paediatric BFDs for up to 23 hours. These results support the hospital practice of discarding unused BFD within 24 hours.

**BACKGROUND AND OBJECTIVES:** Enteral tube feeding is critical for patients with functional gastrointestinal tracts who cannot meet nutritional requirements orally [1]. While commercial enteral nutrition formulas (ENFs) provide standardized nutrients and microbial safety, their high cost (approximately ₦30,000/day) creates significant financial barriers in low- and middle-income health systems [2]. Consequently, hospital-prepared blenderized fluid diets (BFDs) using real whole foods (approximately ₦5,000/day) are frequently utilized, yet empirical data on their nutrient density and microbiological shelf-life remain limited. This study evaluated and compared the nutrient adequacy, microbial safety, and refrigerated shelf-life of hospital-prepared adult and paediatric BFDs against standard commercial ENFs served at Lagos University Teaching Hospital (LUTH).

**MATERIALS AND METHOD:** The experimental comparative study was conducted in the Dietetic kitchen of the Lagos University Teaching Hospital (LUTH). Adult and paediatric BFDs

were formulated from locally sourced ingredients (rice, egg, soya, coconut milk, fruits and vegetables) and compared with commercial ENFs for an adult and a child respectively. Proximate composition, selected minerals (Ca, Mg, Na, K, Fe, P) and vitamins (A, B1, C) were determined by standard AOAC methods. Nutrient delivery per 1,000 mL of prepared BFD was calculated for the adult and paediatric feeds and compared with adult and paediatric commercial ENFs. Microbial parameters (aerobic plate count, yeasts/molds, and targeted pathogens including E. coli, S. aureus, Salmonella spp., L. monocytogenes) were monitored across refrigerated storage (4°C) at 0, 4, 8, and 24 hours. Safe keeping quality was determined using a modified logistic growth model. Data were analyzed using Student's t-tests in SPSS version 23.0 at $\alpha = 0.05$.

**RESULTS:** The adult BFD provided 0.82 kcal/mL with higher protein and dietary fibre but lower fat than the commercial ENF, while the commercial ENF showed higher energy density, fat, calcium, and potassium, and contained no fibre. Paediatric BFD yielded 0.78 kcal/mL and higher protein, while the commercial formula had higher energy density, fat, calcium, and potassium (Table 1). Freshly prepared BFDs complied with ICMSF microbiological safety limits. Salmonella spp., E. coli (VTEC), and L. monocytogenes were not detected. Mathematical growth modelling showed that adult BFD remained microbiologically stable under refrigeration for up to 39 hours and paediatric BFD for up to 23 hours.

**Table 1: Comparative Adequacy and Shelf-Life of Blenderized Fluid Diet versus Commercial Formulas**

| Parameter | Adult BFD | Adult ENF | Paed. BFD | Paed. ENF |
|---|---|---|---|---|
| Caloric Density (kcal/mL) | 0.82 | 1.06 | 0.78 | 1.00 |
| Energy (kcal/L) | 818.2 | 1055.0 | 781.2 | 1000.0 |
| Crude Protein (g/L) | 49.9 | 38.0 | 52.4 | 29.2 |
| Crude Fat (g/L) | 3.6 | 25.3 | 4.0 | 37.5 |
| Dietary Fibre (g/L) | 9.8 | 0.0 | 19.0 | 0.0 |
| Iron (mg/L) | 11.0 | 19.0 | 6.7 | 12.5 |
| Calcium (mg/L) | 213.3 | 1055.0 | 225.4 | 1167.0 |
| Potassium (mg/L) | 328.1 | 1560.0 | 367.8 | 1375.0 |
| Refrigerated shelf-life (h) | 39 | ~8760** | 23 | ~8760** |

**Manufacturer-stated ambient shelf-life of commercial formula (≈ 12 months)*

**CONCLUSION AND RECOMMENDATIONS:** Hospital-prepared blenderized fluid diets (BFDs) are a nutritionally viable whole-food option for enteral feeding. They deliver substantial calories and high protein at a substantially lower cost than the commercial ENFs. Their energy density (0.78–0.82 kcal/mL) and dietary fibre support gastrointestinal function and the elevated protein needs of critically ill patients in resource-limited settings. However, they are low in fat and some micronutrients (calcium, potassium, vitamins A and C), and so targeted fortification may be required for routine use. When prepared under strict hygienic conditions, fresh BFDs are microbiologically safe. Discarding unused feeds within 24 hours provides a clear safety margin. Further studies on tube flow properties and clinical outcomes are recommended.

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# SUB-THEME 6: POSTER

**TITTLE: DIETARY PATTERNS, NUTRITIONAL ADEQUACY AND NUTRITION INTERVENTION AT FIRST ANTENATAL REGISTRATION: A FIVE-YEAR RETROSPECTIVE ANALYSIS AT LAGOS ISLAND MATERNITY HOSPITAL (2019–2023)**

**Theme/Sub-theme:** Innovations in Clinical Nutrition practice across the lifecycle: Aligning Evidence-based protocols with Health systems delivery.
**Author(s): ***Ijiwola F.W, Akowien E. C., Ogunfolaji B.S.,Iyanda O.A., Isola T. F., Ilesanmi A., Safa I.O
**Affiliation:** Department of Nutrition and Dietetics, Lagos Island Maternity Hospital, Lagos, Nigeria.
**Corresponding author e-mail:** fijiwola@gmail.com, 08034614039
**Keywords:** Antenatal nutrition, dietary patterns, nutritional adequacy, maternal health

## HIGHLIGHTS

- 60% of pregnant women had inadequate fluid intake across all trimesters
- Overweight/obesity was prevalent in 65% of participants at first antenatal visit
- First trimester and primigravida women showed highest nutritional inadequacy rates

## BACKGROUND AND OBJECTIVES

Adequate maternal nutrition from the point of first antenatal contact is critical for optimal fetal development and pregnancy outcomes. Despite the pivotal role of dietitians in prenatal care, data on dietary patterns and nutritional status of pregnant women at the point of first registration in Nigerian maternity settings remain limited [1]. Inadequate dietary diversity, poor fluid intake, and excessive gestational weight gain are recognized risk factors for complications including gestational diabetes, pre-eclampsia, and adverse birth outcomes [2]. This study assessed dietary patterns, nutritional adequacy, and key dietary behaviors among pregnant women at their first antenatal registration at Lagos Island Maternity Hospital (LIMH), Lagos, and described the nutrition counselling interventions delivered.

## MATERIALS AND METHOD

A retrospective analysis of Dietitian/Nutritionist-led consultation records was conducted at LIMH covering 3,167 pregnant women seen between 2019 and 2023. Data were obtained through structured individual interviews conducted by a nutritionist/dietitian at the women's first point of contact during antenatal registration, with appropriate nutrition counselling provided at the same visit. Variables assessed included anthropometric indices (weight, height, BMI), gestational age, gravidity, parity, dietary diversity, fluid intake, fruit and vegetable intake, meal frequency, snack patterns, carbonated drink consumption, food aversions, cravings, protein sources, appetite, bowel movement, and food allergies. Data entry was performed from September 2023 to February 2024, followed by cleaning (March–April 2024) and analysis (May–June 2024). Descriptive statistics and frequency analysis were used to summarise findings [3].

## RESULTS AND DISCUSSION

A total of 3,167 pregnant women were analysed, with a mean age of 30.73 ± 5.52 years. The majority (52%) presented in the second trimester. Key anthropometric and dietary findings are shown in Tables 1 and 2.

**Table 1: Anthropometric and reproductive characteristics of participants (n=3,167)**

| Variable | Mean | SD | Range |
|---|---|---|---|
| Age (years) | 30.73 | 5.52 | 15 – 63 |
| Weight (kg) | 73.34 | 16.48 | 23.0 – 162.1 |
| Height (m) | 1.62 | 0.07 | 1.19 – 2.00 |
| BMI (kg/m²) | 27.94 | 5.91 | 9.5 – 55.7 |
| Gravidity | 2.29 | 1.34 | 1 – 10 |
| Parity | 0.90 | 1.08 | 0 – 6 |

*SD = Standard Deviation*

The mean BMI of the women was 27.94 kg/m², representing the average body mass index of the study population. Dietary diversity was adequate in 87.6% of women overall; however, inadequacy was most pronounced in the first trimester. A critical public health concern was the finding that 60.1% of participants had inadequate fluid intake, with first-time mothers (primigravida) recording the highest inadequacy rate at 65.4%. The most commonly consumed vegetables were ugwu (58.2%), ewedu (41.6%), and waterleaf (29.2%), reflecting local dietary preferences. Fish (73.2%), egg (63.9%), and meat (61.6%) dominated protein consumption, while plant-based proteins such as beans were under-consumed (1.5%). Pastry-based snacks (meat pie, biscuit) were the most popular snack choices, and malt drinks, Fanta, and Coke were the most frequently consumed carbonated beverages among those who reported such intake. Most women (77%) reported no food aversions and 88% reported no specific cravings, suggesting that dietary intake for the majority was not significantly constrained by these factors [5].

**Table 2: Summary of key dietary findings at first antenatal registration**

| Dietary Indicator | Finding |
|---|---|
| Dietary diversity adequacy | 87.6% adequate overall |
| Fluid intake adequacy | 39.9% adequate; 60.1% inadequate |
| Average daily meals | 3 meals/day |
| Most consumed vegetable | Ugwu (58.2%) |
| Most consumed fruit | Watermelon (65.6%) |
| Leading protein source | Fish (73.2%) |
| Food aversions reported | 23.0% of participants |
| BMI category (majority) | Overweight/Obese (65%) |

## CONCLUSION AND RECOMMENDATIONS

Most pregnant women attending antenatal registration at LIMH demonstrated adequate dietary diversity; however, inadequate fluid intake and overweight/obesity were highly prevalent. The first trimester and primigravida women represent priority groups for early, targeted nutrition counselling. Routine Dietitian/Nutritionist-led assessment at the point of first antenatal contact provides a critical opportunity to identify at-risk women and deliver timely, personalised nutrition interventions. Healthcare facilities are recommended to integrate structured Dietitian/Nutritionist consultations as a standard component of antenatal registration, with emphasis on hydration

education, weight management, and dietary diversification to improve maternal and foetal health outcomes.

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**Sub-Theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Comparative In Vitro and Ex Vivo Evaluation of the Antidiabetic and Antioxidant Potentials of *Abelmoschus esculentus* (Okra) Leaf, Pod, and Seed Extracts

**Authors:** *Aloysius, M.T.[1], Olowoniyi, D.F.[2], and Obaje, G.S.[3]*

[1]Department of Nutrition & Dietetics; Federal Polytechnic, Nasarawa

[2]Department of Biochemistry; Federal Polytechnic, Nasarawa

[3]Department of Anatomy, Faculty of Basic Medical Sciences, Alex Ekwueme Federal University Ndufu Alike Ebonyi State, Nigeria

**Corresponding author email:** aloysiusmorris500@gmail.com; **Phone:** 08064387697

**Keywords:** *Abelmoschus esculentus*, alpha-glucosidase, antioxidants, diabetes

**Highlights:**

- Okra pods beat leaves/seeds in antidiabetic action.
- Fresh okra extract cuts blood glucose by 37% in diabetics.
- Pods show top antioxidant & enzyme inhibition effects.

**Background and Objectives:** Diabetes mellitus is a growing public health challenge in Nigeria, necessitating affordable, accessible, and evidence-based dietary interventions. Okra (*Abelmoschus esculentus*) is widely consumed, but its comparative antidiabetic potential across different plant parts (leaf, pod, seed) remains underexplored. This study comparatively evaluated the alpha-amylase and alpha-glucosidase inhibitory activities, antioxidant capacity (FRAP and DPPH), and ex vivo fasting blood glucose (FBG) lowering effect of fresh okra extract in diabetic volunteers.

**Materials and Methods:** Aqueous extracts of okra leaf, pod, and seed were prepared. Enzyme inhibition assays and antioxidant assays were conducted at 25–200 µg/mL, with acarbose and ascorbic acid as standards. Fresh okra extract (20 mL) was administered to four type 2 diabetic volunteers (W, X, Y, Z) for 7 days, with FBG measured before and after. The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board of Federal Polytechnic, Nasarawa.

**Results and Discussion:** All okra parts inhibited alpha-amylase and alpha-glucosidase dose-dependently ($p<0.05$). Okra pods showed the highest enzyme inhibition (alpha-glucosidase at 200 µg/mL: pods 76.32±1.34%; seeds 71.21±1.03%; leaves 64.85±3.30%), though lower than acarbose. Antioxidant activity followed similar trends: FRAP and DPPH inhibition ranked pods > seeds > leaves, but all were significantly lower than ascorbic acid ($p<0.05$). These findings align with [1], who reported that okra pod polysaccharides competitively inhibit alpha-glucosidase, and [2], who found higher phenolic content in pods. In diabetic volunteers, fresh okra extracts significantly reduced mean FBG from 21.78±5.09 mmol/L to 13.65±5.92 mmol/L ($p<0.05$), representing a 37.3% reduction, consistent with [3], who observed similar hypoglycemic effects in type 2 diabetes patients [4], [5], [3].

**Table 1: Alpha amylase percentage inhibition comparison of okra pods, seed, and leaf with acarbose at different levels of concentration**

| Concentration($\mu g$/ml) | Okra pods | Okra seed | Okra leaf | Acarbose |
|---|---|---|---|---|
| 200 | 74.21±1.76[a] | 68.97±0.24[a] | 68.78±0.62[a] | 87.32±0.87[b] |
| 100 | 59.58±1.46[a] | 51.59±0.79[a] | 60.21±0.73[a] | 78.32±0.53[b] |
| 50 | 46.59±0.58[a] | 39.86±0.35[a] | 43.94±0.18[a] | 60.32±3.23[b] |
| 25 | 31.05±1.13[a] | 26.59±1.62[a] | 34.67±1.68[a] | 45.53±1.64[b] |

*Results are expressed as mean value ± SD. Different superscripts in each row mean that the percentage inhibition comparison for okra extracts vs acarbose is significantly different ($p<0.05$, 95% confidence level).*

**Table 2: Fasting blood sugar test of volunteers with confirmed cases of diabetes administered with fresh okra extract**

| Volunteers | Before Okra extract (mmol/L) | After Okra extract (mmol/L) |
|---|---|---|
| W | 29.20±0.10[b] | 6.30±0.10[a] |
| X | 21.60±0.20[a] | 19.50±0.20[b] |
| Y | 17.50±0.30[b] | 10.00±0.24[a] |
| Z | 17.50±0.40[a] | 18.80±0.40[b] |
| Average response | 21.78±5.09[b] | 13.65±5.92[a] |

*Results are expressed as mean value ± SD. Different superscripts in each row mean that the fasting blood sugar test before and after okra extract is significantly different ($p<0.05$, 95% confidence level).*

**Conclusion and Recommendations:** Okra pods exhibited superior antidiabetic and antioxidant properties compared to leaves and seeds. Fresh okra extracts substantially lowered fasting blood glucose. Okra, especially pods, holds promise as a functional food adjuvant in diabetes management. It is recommended that dietitians prioritize okra pods in glycemic control protocols, and that further randomized controlled trials with larger sample sizes be conducted.

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**Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title:** Nutritional Components and Stability Studies of Two Locally Formulated Anti Sickling Nutraceuticals: Sicklo-N100 And Sicklo-N200.

Name of Authors: Abdulazeez, B. O.[1*], Salawudeen, S. O.[1] and Abdullahi, N. M.[2].

**Affiliation of Authors:** [1]Department of Biochemistry, Confluence University of Science and Technology, Osara, Kogi State
[2]Department of Biological Sciences, Confluence University of Science and Technology, Osara, Kogi state
*Corresponding author's email: abdulazeezbo@custech.edu.ng, +2347037675307

**Keywords:** Nutraceutical, Sicklo-N100, Sicklo-N200 and anti-sickling.

**Highlights:**

- Two nutraceuticals were formulated in this research, coded as Sicklo-N100 and Sicklo-N200 to contain nutrients that have been established to be good for sickle cell anaemia patients.
- Comparisons between the two formulations show that Sicklo-N200 is a promising nutraceutical that could be included in the management of sickle cell anaemia.

**BACKGROUND AND OBJECTIVES:**

Some nutrients have been reported to have anti-sickling effects on sickle cell anaemia patients. This research investigated the nutritional components and stability of two locally formulated anti-sickling nutraceuticals: Sicklo-N100 and Sicklo-N200.

**MATERIALS AND METHODS:**

Proximate composition, antioxidant minerals and total antioxidant capacity were determined by the methods of association of official analytical chemistry (AOAC, 2006), atomic absorption spectrophotometry (AAS) and spectrophotometry respectively. Accelerated stability studies were conducted while accessing the physical features, β-carotene level, pH, microbial count, and viscosity of the nutraceuticals on a weekly basis for 28 days.

**RESULTS AND DISCUSSION**

There was significant increase ($P<0.05$) in the proximate composition (except for moisture content), antioxidant minerals and total antioxidant capacity of Sicklo-N200 as compared to Sicklo-N100. Comparing Sicklo-N100 and Sicklo-N200, significant increase ($P<0.05$) was observed in the β-carotene level of Sicklo-N200 compare to Sicklo-N100, and higher pH value while there is significant decrease ($P<0.05$) in the microbial load of Sicklo-N200 compared to Sicklo-N100. Significant decrease ($P<0.05$) was observed in the β-carotene level, pH, and microbial load of Sicklo-N100 while that of Sicklo-N200 were relatively stable when day 0 was compared with other days. The analysis of Sicklo-N100 and Sicklo-N200, as shown in Table 1, confirms the presence of essential antioxidant minerals including zinc, copper, selenium, chromium, and manganese. Given that sickle cell anemia (SCA) often predisposes individuals to deficiencies in these nutrients, their presence is vital for protecting red blood cell membranes against oxidative damage induced by reactive oxygen species [1]. Beta carotene possesses important health promoting activities due to their antioxidant activities which might be helpful in the management of SCA [2].

**Table 1: Antioxidant mineral contents of Sicklo-N100 and Sicklo-N200**

| Minerals | Sicklo-N100 (mg/g) | Sicklo-N200 (mg/g) |
|---|---|---|
| Zn | $0.62 \pm 0.05_x$ | $7.02 \pm 1.13_y$ |
| Cu | $0.35 \pm 0.02_x$ | $3.55 \pm 0.23_y$ |
| Se | $0.3 \pm 17.74_x$ | $2.89 \pm 29.57_y$ |
| Cr | $0.32 \pm 0.04_x$ | $1.40 \pm 0.22_y$ |
| Mn | $1.54 \pm 0.10_x$ | $14.14 \pm 0.34_y$ |

Values are expressed as Mean ± SEM of three replicates. Values with different subscript in the same row (Comparing Sicklo-N100 and Sicklo-N200) are significantly different ($P<0.05$)

**Table 2: β- carotene concentrations of Sicklo-N100 and Sicklo-N200 for 28 days**

| Days | Sicklo-N100 (mg/g) | Sicklo-N200 (mg/g) |
|---|---|---|
| Day0 | $36.96 \pm 0.44^{a}_{x}$ | $148.24 \pm 0.05^{a}_{y}$ |
| Day7 | $20.00 \pm 0.17^{b}_{x}$ | $148.03 \pm 0.07^{a}_{y}$ |
| Day14 | $19.20 \pm 0.21^{b}_{x}$ | $147.76 \pm 0.09^{b}_{y}$ |
| Day21 | $15.12 \pm 0.05^{b}_{x}$ | $147.49 \pm 0.13^{b}_{y}$ |
| Day28 | $11.89 \pm 0.03^{b}_{x}$ | $147.41 \pm 0.10^{b}_{y}$ |

Values are presented as Mean ± SEM of three replicates. Mean in the same column with different superscript (comparing Day 0 with other days) and mean in the same row with different subscript (Comparing Sicklo-N100 and Sicklo-N200) are significantly different ($p<0.05$).

## CONCLUSION AND RECOMMENDATION

The results of this research indicated that Sicklo-N200 has higher nutritional components and is more stable (shelf life of 16 months) than Sicklo-N100 (shelf life of 2 days). Sicklo-N200 is

recommended for clinical trials so as to conclude on its fitness to be included in the nutraceuticals of sickle cell anaemia patients.

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**Theme/sub-theme:** Innovations in Clinical Nutrition Practice across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title**: Relationship between Glycaemic Control and Micronutrient Status in Individuals with Type 2 Diabetes Mellitus.

**Authors**: Oniyide, A. A [1], Onuoha, A. Miracle[2], Awonowo, D. O [1], Oguniyi, S.O[3], Olaiya, E. O[4], Agnesanwa, T[5], Sola-Oniyide, B.A[6]

**Authors' Affiliation:** [1]Department of Physiology, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria;

[2]Department of Human Nutrition and Dietetics, Afe Babalola University, Nigeria

[3] Department of Internal Medicine, Afe Babalola Multi-System Hospital, Ado-Ekiti, Nigeria;

[4] Department of Medical Biochemistry, College of Medicine and Health Sciences, Afe Babalola University, Ado-Ekiti, Nigeria;

[5] Department of Family Medicine, Ekiti State University Teaching Hospital, Ado-Ekiti, Nigeria;

[6]Department of Paediatrics and Child Health, Afe Babalola Multi-System Hospital, Ado-Ekiti, Nigeria.

**Corresponding author:** miracleonuoha48@gmail.com +2349060659099.

**Keywords:** Type 2 Diabetes Mellitus; Glycemic Control; Micronutrient Imbalance; Diabetic Neuropathy; Oxidative Stress.

**Highlights**

- convergent parallel design was conducted among 422 adults with T2DM
- Magnesium imbalance did not demonstrate statistical significance (p = 0.07).
- Micronutrient abnormalities, particularly involving zinc, iron, and copper, are significantly associated with glycemic control among individuals with T2DM

**Background:** Micronutrients play a critical role in glucose metabolism insulin synthesis [1] insulin sensitivity, antioxidant defense, and the prevention of diabetes-related complications [2] . Micronutrient imbalances such as zinc, selenium, and copper have been implicated in poor glycemic regulation and diabetic complications among individuals with T2DM. However, evidence from Sub-Saharan Africa remains limited [3]. This study investigated the relationship between glycemic control and micronutrient status among individuals with T2DM in Kwara State, Nigeria.

**Methods:** A longitudinal mixed-method study using a convergent parallel design was conducted among 422 adults with T2DM attending the University of Ilorin Teaching Hospital. Participants were recruited through multistage sampling. Plasma levels of zinc, iron, copper, and magnesium were analysed alongside glycemic control indices. Descriptive and inferential statistics, including logistic regression and t-tests, were performed at $p < 0.05$.

**Results:** a positive significant associations were observed between glycemic control and micronutrient status among participants with T2DM. Zinc imbalance ($p = 0.01$), iron imbalance ($p = 0.01$), and copper imbalance ($p = 0.04$) were significantly associated with poor glycemic control. Magnesium imbalance did not demonstrate statistical significance ($p = 0.07$). Participants with prolonged diabetes duration and poorer glycemic indices also demonstrated higher prevalence of diabetic neuropathy. The findings suggest that altered micronutrient homeostasis may contribute to metabolic dysregulation and progression of diabetic complications.

**Conclusion**: Micronutrient abnormalities, particularly involving zinc, iron, and copper, are significantly associated with glycemic control among individuals with T2DM. Integrating micronutrient assessment into diabetes management may improve metabolic outcomes and reduce diabetes-related complications.

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**Theme/ Sub-theme**Innovations in Clinical Nutrition Practice across the ife Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title**: Anti-Hyperuricemic and Antioxidant Potential*of Hunteria Umbellata* Seeds in Pyrazinamide Induced Hyperuricemia in Rats.

**Names of Authors:** Odoemenam, C.C[1]. and Ugbenyen, A.M[1*]

[*]**Corresponding author email**: ugbenyen.anthony@edouniversity.edu.ng

[1]**Affiliation of Authors:** Edo State University, Iyamho

**Keywords:** Uric acid, Hyperuricemia, *Hunteria umbellata*, Catalase.

**Highlight:** *Hunteria umbellate* seed extract reduced high serum uric acid level,
and normalizedantioxidants enzyme levels.
These findings validate the conventional use of *Hunteria umbellata* for herbal medicine

**Background & Objectives**The global number of individuals affected by gout is on the rise (1). Hyperuricemia is a frequently encountered condition in clinical practice (2). Hyperuricemia (HUA) is a metabolic dysfunction arising from abnormalities in purine metabolic process. It is characterized by raised blood urate concentration. Clinically, the reference values are defined as above 7 mg/dL (milligrams per deciliter) in males, over 6 mg/dL in females, and exceeding 5.5 mg/dL in adolescents and children.Medicinal plants play a crucial role in the discovery and development of new drugs globally. In Africa, *Hunteria umbellate* stands out among these plants, with various parts traditionally used to treat numerous health conditions.This study aims to explore the anti-hyperuricemic and antioxidant potentialof the aqueous seed extract of the plant.

**Materials and Methods:** Seeds of the *Hunteria umbellata* plant were obtained from EkpomaMarket in Edo State, Nigeria.The functional groups in the extract were identified using FTIR spectroscopy.Thirty (30) maleWistar rats, were used for the study.500 mg of pyrazinamide was used to induced hyperuriceamic in rats according to the weight of the rat. uric acid concentration wasassayed by the method of Browne *et al*., 2019 (3).Catalase and superoxide dismutase (SOD)activities were measured according to protocol Peter *et al* 2021(4) and Sirota, 2012 (5) respectively.

**Results and Discussions**The plant extract was effective in reducing uric acid concentration in the serum. Group 2, which represent the negative control group, which received only pyrazinamide,

without treatment showed a significant increase (12.86 ± 1.1 mg/dl) in uric acid concentrations in serum. This aligns with an earlier study (6) as shown in Figure 1.

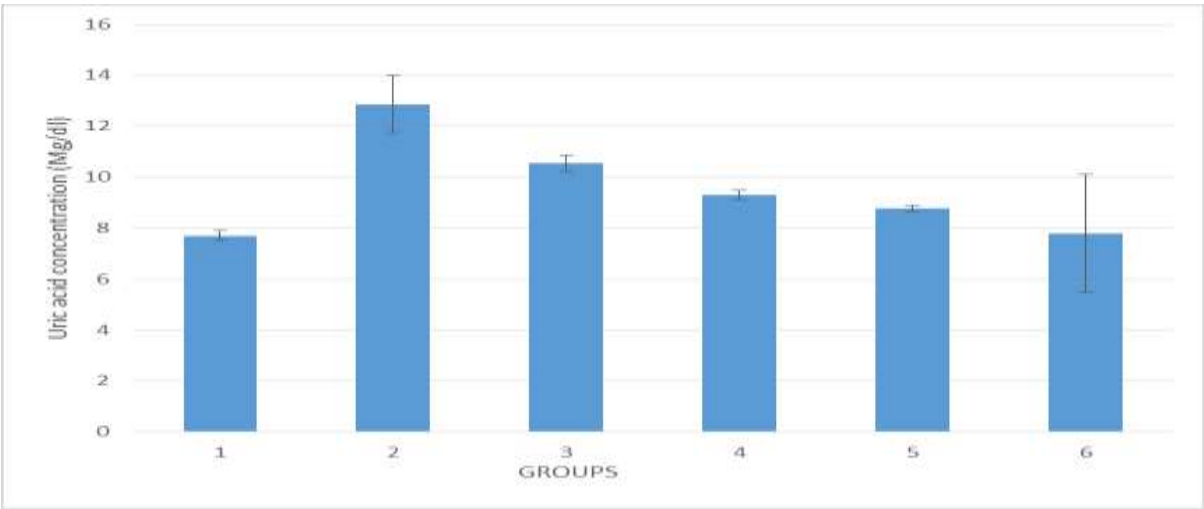



Figure 1: Effect of *Hunteria umbellate* seed extracts on serum uric acid concentrations of rats

**Conclusions:** The prevalence of gout and hyperuricemia is rising, posing a significant healthcare challenge worldwide. These conditions are linked to various comorbidities and increased mortality risk, highlighting the need for a comprehensive management strategy. This study highlights the significant beneficial effects of *Hunteria umbellata* seed extract in reducing high serum uric acid level, and normalizing antioxidants enzyme levels.

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**Theme/sub-theme:** Innovations in Clinical Nutrition Practice across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title:** Nutritional Profile, Phytochemical Composition, and In Vitro Anticancer Potential of Wild *Chenopodium album* Leaves; Implications for Functional Food Development.

**Adamu Yabagi Muhammad [2]; Mansurah Abdulazeez [1,3]; Aminu Ibrahim [1]**

1. **Department of Biochemistry, Faculty of Basic Medical Sciences, College of Health Science, Bayero University Kano, Nigeria**
2. **Department of Nutrition and Dietetics, Federal University of Agriculture, Mubi, Nigeria**
3. **Centre for Biotechnology Research and Training, Bayero University Kano, Nigeria**

*Correspondence: egwa28@gmail.com

**Keywords:** Chenopodium album, antioxidant activity, antinutrients, proximate composition, cytotoxicity.

**Background and Objective:**

Chenopodium album (lamb's quarters) is an underutilized leafy vegetable renowned for its diverse therapeutic and nutritional properties. While previous research shows Chenopodium album extracts exhibit cytotoxic activity against breast and colon cancer cells, data regarding its impact on cervical cancer cells remains lacking (Khan et al., 2021; Rana et al., 2020). Additionally, few studies systematically examine how its nutritional composition, antioxidant capacity, and cytotoxic properties interrelate. This study evaluated the proximate composition, mineral profile, vitamin content, antinutritional factors, antioxidant capacities, and in vitro anticancer potential of sequentially extracted C. album leaves (using n-hexane, ethyl acetate, and methanol).

**Methods:**

Standard analytical methods were used for proximate and phytochemical screening. Antioxidant properties were measured using DPPH, Total Antioxidant Capacity (TAC), and Ferric Reducing Antioxidant Power (FRAP) assays, while cytotoxicity against HeLa cancer cells was evaluated via the MTT assay.

**Results and Discussion:**

Dry matter analysis revealed an exceptionally high ash content (32.10±0.71 g/100g), alongside carbohydrates (44.51±0.94 g/100g), crude fiber (8.34±0.51 g/100g), protein (6.22±0.75 g/100g), and low crude fat (2.58±0.34 g/100g). The leaves exhibited substantial macro- and micro-mineral concentrations, notably potassium (6,932±87.51 mg/kg), calcium (3,832±79.10 mg/kg), magnesium (2,588±56.19 mg/kg), and iron (1,920±150 mg/kg), alongside, moderate levels of antinutrients (oxalate, phytate, tannins, and saponins). Among the extracts, the methanol fraction yielded the highest vitamin C (0.18±0.05 mg/g), vitamin E (0.49±0.05 mg/g), total phenolics (182.51±3.82 mg GAE/g), and total flavonoids (43.57±0.30 mg QE/g). This fraction also demonstrated superior antioxidant scavenging capacity (DPPH $IC_{50}$=21.10±0.36 μg/g) and moderately suppressed HeLa cell viability (80.53% remaining at 200 μg/mL) compared to the standard drug doxorubicin (23.76%).

**Conclusion:**

These findings indicate that C. album leaves are a potent source of essential minerals and bioactive antioxidants with moderate cytotoxic properties, supporting their integration into functional foods and dietary strategies aimed at combating micronutrient deficiencies and oxidative stress-related diseases in Nigeria.

**Recommendation**

Incorporate *Chenopodium album* leaves into local diets and functional foods to combat micronutrient deficiencies and manage oxidative stress-related diseases.

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**Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title:** Barriers And Motivators to Caregiver Adherence to Nutrition Interventions for Children in Selected Tertiary Hospitals in Southwest Nigeria: Dietitians' Perspective

**Name of Authors:** Samuel, J.O.[1] and *George, O.M.[2]

**Affiliation of Authors:** [1]Department of Dietetics, University College Hospital, Ibadan, Oyo State, Nigeria

**Corresponding Author's email address:** opeyemigeorge95@gmail.com

**Corresponding Author's Phone number:** +2348101095926

**Keywords**: Caregiver adherence; Child malnutrition; Dietitians' perceptions; Paediatric nutrition

**Highlights**

- Severe acute malnutrition was the most prevalent nutritional problem (75%).
- Healthcare provider encouragement and simple language drove caregiver adherence.
- Financial limitations and food taboos were the most frequently reported barriers.

**BACKGROUND AND OBJECTIVES:** Child malnutrition remains a major public health challenge in Nigeria [1]. Although evidence-based nutrition interventions such as dietary counselling and medical nutrition therapy are routinely provided in healthcare settings, the success of these interventions depends largely on sustained caregiver adherence [2]. This study explored Dietitians' perceptions of the barriers and motivators to caregiver adherence to nutrition interventions among children in selected tertiary hospitals in Southwest Nigeria.

**MATERIALS AND METHOD:** A descriptive cross-sectional study design was employed. Key informant interview was conducted for ten registered Dietitians from three tertiary hospitals (University College Hospital, Ibadan; Federal Medical Centre, Abeokuta; and Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife) in Southwest Nigeria. All interviews were audio-recorded with participants' consent, transcribed verbatim, and analysed using thematic analysis with NVivo 15 software. Ethical approval was obtained from the UI/ UCH Ethical Review Committee (UI/EC/25/01248).

**RESULTS AND DISCUSSION:** Severe acute malnutrition was identified as the most prevalent nutritional problem managed by Dietitians (75.0%), followed by congenital disease-associated malnutrition (62.5%). Complementary feeding challenges and paediatric diabetes were also reported, while overnutrition and post-operative cases were less frequently encountered. More than

half of the dietitians (62.5%) described caregiver involvement as high. Major motivators included healthcare provider encouragement and supportive counselling (75.0%), and simple, clear language during nutrition education (75%). Family support and visible improvement in the child's health condition were each reported by 62.5% of dietitians as adherence-encouraging factors. Barriers to adherence were multifactorial and interconnected. Financial limitations and cultural/social barriers, particularly food taboos, were the most frequently reported barriers, each identified by 75.0% of Dietitians. Misinformation affecting caregiver decision-making was reported by 50% of dietitians [3]. Caregiver nonchalant attitudes, communication and institutional barriers, knowledge gaps, and emotional stress or depression were each reported by 62.5% of respondents [4]. Dietitians recommended strategies including early nutrition education, improved communication skills, promotion of affordable local foods, and financial support mechanisms (37.5% each), alongside community-based follow-up centres (25%). These findings align with those reported among caregivers of children with other chronic conditions [5].

**CONCLUSION AND RECOMMENDATION(S):** Caregiver adherence to paediatric nutrition interventions in Southwest Nigeria is influenced by complex interactions between socioeconomic, cultural, psychological, knowledge-related, and institutional factors. While supportive counselling, clear communication, family support, and visible child improvement encourage adherence, financial constraints and cultural barriers remain significant challenges. Improving child nutrition outcomes requires individualized strategies that strengthen dietitian-caregiver communication, promote culturally appropriate nutrition education, address financial barriers, and establish effective follow-up systems.

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# SIGNIFICANCE OF DIETARY INTAKES IN CHANGES IN WEIGHT OF BREAST CANCER PATIENTS BEFORE AND AFTER CHEMOTHERAPY IN NIGERIA

OJO. C.I[1], ADEKOYA A.S[1,2]

1. Department of Home and Rural Economics, Federal Cooperative College, Ibadan, Nigeria

2. Department of Human Nutrition and Dietetics, Federal University of Medicine and Medical Sciences, Abeokuta, Nigeria

**Corresponding Author: e-mail:** christianaolutayo@gmail.com, krisbod45@yahoo.com

**Tel. +2348033918472**

**Highlight:** Patients diagnosed with cancer and undergoing treatment, experience a multitude of symptoms. These include fatigue, pain, and difficulty in breathing, nausea, appetite loss and unintentional weight changes. Dietary interventions have been found to lessen weight loss and improve health status (1-4).

**Background and Objectives:** This study focus on the association between dietary intakes and changes in weight among breast cancer patients before chemotherapy treatment and during chemotherapy treatment in Nigeria.

**Materials and Method:** A convenient sample of breast cancer patients undergoing chemotherapy treatment in a clinic was recruited during clinic hour. 50 patients with breast cancer were selected, of which 25 were of cases and 25 were for controls. Cases were those on chemotherapy and controls were those not on chemotherapy during the study. The subjects were asked to administer questionnaire to obtain information on variables such as demographic data, breast cancer diagnosis, dietary changes, and anthropometric data and health outcomes. The data were analysed and interpreted statistically using statistical tools to describe the variablesBBNN/

**Results and Discussion:** The result showed mean baseline weight of control of 68.2 kg while that of cases was 70.0kg. The mean weight of cases and controls was 63.6 kg while that of cases was 68.1kg. Both group lost weight during the course of their treatment, but controls lost more weight than cases. There was no significant difference in the baseline weight of cases and controls ($p = 0.61$), and also no significant difference in weight loss between cases and controls ($p = 0.21$). The most frequently consumed in the study population were snacks/pastries, 15.8% cases, 35% controls, fruits 31% cases, 25% controls.

**Table 1: Association between breast cancer stages, weight change, frequency of eating meal / day and in-between meal.**

| **Cancer Stages** | **Cases** | **Control** | **P-Value** |
|---|---|---|---|
| 1 | 0 (0.0) | 1 (4.0) | 0.10 |
| 2 | 0 (0.0) | 4 (16.0) | 0.10 |
| 3 | 13 (52.0) | 13 (52.0) | |
| 4 | 12 (48.0) | 7 (28.0) | |
| **Changes in frequency of eating main meal:** | | | |
| **Before chemotherapy** | **Cases Freq. (%)** | **Control Freq. (%)** | |
| 1 | 1 (4.0) | 3 (12.0) | |
| 2 | 21 (84.0) | 18 (72.0) | |
| 3 | 3 (12.0) | 4 (16.0) | |
| **During chemotherapy** | | | |
| 2 | 11 (45.83) | | |
| 3 | 12 (50.0) | | |
| 4 | 1 (4..17) | | |
| **Changes in frequency of eating in-between meal:** | | | |
| **Before chemotherapy** | **Cases Freq. (%)** | **Control Freq. (%)** | |
| Y | 19 (76.0) | 20 (80.0) | |
| N | 6 (24.0) | 5 (20.0) | |
| **During chemotherapy** | | | |
| Y | 0 (0.0) | | |
| N | 11 (44.0) | | |
| Null | 14 (56.0) | | |
| **Food consumed** | **Cases Freq. (%)** | **Control Freq. (%)** | |
| Snacks / Pastries | 3 (15.8) | 7 (35.0) | |
| Fruits | 6 (31.6) | 5 (25.0) | |
| Biscuit | 7 (36.8) | 5 (25.0) | |
| Others | 3 (15.8) | 3 (15.0) | |

**Conclusion and Recommendations:** These findings revealed diets and frequency of their consumption, which influenced the outcomes of the treatments before chemotherapy, during chemotherapy, and after chemotherapy. A well-balanced diet should be recommended, and maintained as main meal or in-between meal for breast cancer patients between before chemotherapy and during chemotherapy to improve their health outcomes (5).

***Keywords:*** *Weight, Dietary Intakes, Breast Cancer, Chemotherapy treatment.*

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*Sub-Theme: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery*

# Diet Quality, Nutrient Adequacy and Cardiometabolic Risk among Adults Living with HIV in Nigeria

***Ani, P. N., Eze, S. N., Onyeji, G. N. & Ugwu, C. C.**

Department of Nutrition and Dietetics, University of Nigeria, Nsukka Enugu State, Nigeria
***Corresponding author email:** peace.ani@unn.edu.ng, +2348032501119
**Keywords:** nutrient adequacy, noncommunicable diseases, obesity, HIV

## HIGHLIGHTS

- Most participants had high dietary diversity despite low nutrient adequacy.
- Nearly half of participants were overweight/obese and hypertensive.
- Dietary diversity was not associated with cardiometabolic risk factors.

**BACKGROUND AND OBJECTIVES:** People living with HIV (PLHIV) are increasingly living longer due to antiretroviral therapy (ART), but they also face a growing burden of cardiometabolic disorders, including obesity and hypertension. Adequate dietary intake is essential for immune function, treatment response, and prevention of non-communicable diseases however, evidence on nutrient adequacy and its relationship with cardiometabolic risk among Nigerian PLHIV remains limited. This study assessed diet quality, nutrient adequacy, and cardiometabolic risk factors among adults living with HIV in Nigeria.

**MATERIALS AND METHOD:** A cross-sectional study was conducted to recruit 104 adults receiving antiretroviral therapy in Bishop Shanahan hospital, Nsukka, Enugu State, Nigeria. Participants were recruited using convenience sampling. Structured questionnaire was used to collect sociodemographic characteristics and dietary habits. Dietary intake was assessed using a 24-hour dietary recall and dietary diversity score (DDS). Anthropometry (body mass index [BMI], waist-hip ratio [WHR]) and blood pressure measurement were conducted using standard methods. Data were analysed using Statistical Product and Service Solutions (SPSS) version 21, and significance was accepted at $p<0.05$.

**RESULTS AND DISCUSSION:** The participants were mostly female (61.5%), aged 20-40 years (56.8%), and educated to tertiary level (51.0%). Majority (74.1%) consumed meals two to three times daily. Although 69.2% achieved high dietary diversity score, average energy intake met was

only 45.2% of the Recommended Dietary Allowance (RDA) among males and 71.1% among females. Protein and fat intake were also below recommended levels (Table 1).

**Table 1. Nutrient adequacy and dietary diversity among adults living with HIV (N=104)**

| Variable | Male | Female |
|---|---|---|
| Energy intake (% RDA) | 45.2 | 71.1 |
| Protein intake (% RDA) | 37.3 | 42.7 |
| Fat intake (% RDA) | 35.2 | 48.1 |
| Carbohydrate intake (% RDA) | 54.2 | 69.8 |
| High dietary diversity (%) | - | 69.2* |

*Overall dietary diversity among all participants.

Nearly half of the respondents were overweight or obese (44.2%), 49.0% were hypertensive, and 13.5% had elevated waist-hip ratios, indicating substantial cardiometabolic risk (Table 2).

**Table 2. Cardiometabolic risk profile and association with dietary diversity (N=104)**

| Variable | Prevalence (%) | p-value (DDS association) |
|---|---|---|
| Overweight/obesity | 44.2 | 0.636 |
| High waist-hip ratio | 13.5 | 0.725 |
| Hypertension | 49.0 | 0.122 |

DDS = Dietary Diversity Score

Dietary diversity was not significantly associated with BMI, waist-hip ratio, or blood pressure ($p > 0.05$). These findings suggest that while dietary diversity was generally high, it may not adequately reflect dietary quality or nutrient adequacy. Similar observations have been reported among PLHIV, where antiretroviral therapy, chronic inflammation, sedentary lifestyles, and poor food quality contribute to cardiometabolic abnormalities rather than dietary diversity alone [1–3].

**CONCLUSION AND RECOMMENDATIONS:** Dietary diversity alone was not associated with cardiometabolic risk, suggesting that dietary quality and other clinical or lifestyle factors may play more important roles. Routine nutritional assessment should therefore emphasize nutrient adequacy and diet quality, alongside lifestyle counselling and cardiometabolic risk screening among PLHIV.

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**Theme: Delivering better nutrition for all: connecting the dots across life cycle, systems and sectors**

**Sub-Theme**: Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence Based Protocols with Health System Delivery.

**Title**: Nutrition and Health Status of People Living with HIV in Oron LGA of Akwa Ibom State

**Name of Authors:** *Udoiwod, J. D. and Aburime, L. C

**Affiliation of Authors**: Department of Human Nutrition and Dietetics, Faculty of Basic Medical Sciences, University of Calabar, Cross River State Nigeria.

*__Corresponding Author__:jessy2online@gmail.com, 08034326140

**Key words**: Human Immunodeficiency Virus, Antiretroviral, Nutritional status.

**Highlights**:

- The coexistence of overweight/obesity and undernutrition suggests a double burden of malnutrition
- This is a strong indication of the integration of nutrition counselling into ART service delivery in the study area.

**BACKGROUND AND OBJECTIVES**:
HIV /AIDS remains a major global issue with approximately 38 million people living with the virus worldwide [1,2]. This study evaluated the nutritional and health status, of PLHIV in Oron Local Government Area (LGA) of Akwa Ibom State, Nigeria.

**MATERIALS AND METHOD:**
A cross-sectional descriptive study was conducted among 92 PLHIV receiving antiretroviral therapy (ART) in 4 selected health facilities within Oron LGA. Data were collected using structured questionnaires and blood samples were collected for biochemical assessments. Variables included sociodemographic information, anthropometric indices, blood pressure, blood glucose. Descriptive statistics were analyzed using SPSS. Ethical approval was obtained from the Ethical Committee of the Ministry of Health, Akwa Ibom State in accordance with the code of ethics on human experimentation drafted by the World Medical Association in 1964.

**RESULTS AND DISCUSSION** A higher proportion of respondents were female (67.4%) compared to males (32.6%). In terms of marital status, over half were married (52.2%), while 34.8% were single. Only a small percentage were divorced (3.3%), widowed (8.7%), or separated (1.1%). Regarding Body Mass Index (BMI), 45.7% of the respondents fell within the normal range (18.5–24.9), whereas 28.3% were overweight, 19.6% obese, and 6.5% underweight. Mid-Upper Arm Circumference (MUAC) showed that 95.7% had normal nutritional status (23–32 cm), with 3.3% classified as undernourished (<23 cm) and only 1.1% falling in the obese range (>32 cm).

Table 1 presents the health status of the respondents, Blood pressure readings showed that the majority (68.5%) had normal values, while 10.9% had hypotension. Fasting blood glucose level showed that none of them were hypoglycemic, 32.6% had normal blood glucose level, 66.3% had prediabetic readings while 1.1% had values blood glucose level greater than 7.0 mg/, Blood pressure measurements showed that 16.2% had values in the elevated and hypertensive range. This suggests the possibility of undiagnosed hypertension, an issue frequently reported in low-resource settings where routine screening is limited [3]

**TABLE 1**

Health status of respondents

| Health Parameters | Variables | Frequency (n=92) | Percentage (%) |
|---|---|---|---|
| Blood pressure (mmHg) | Hypotension (<90/60) | 10 | 10.9 |
| | Normal (<120/80) | 63 | 68.5 |
| | Elevated (120 – 129/<80) | 5 | 5.4 |
| | Hypertension stage 1 (130 – 139/80 -89) | 4 | 4.3 |
| | Hypertension stage 2 (>140/>90) | 6 | 6.5 |
| Fasting blood glucose level (mg/dL) | Hypoglycemic (<3.9) | 0 | 0 |
| | Normal (3.9 – 5.5) | 30 | 32.6 |
| | Prediabetic (5.6 – 6.9) | 61 | 66.3 |
| | Diabetic (> 7.0) | 1 | 1.1 |
| Mean fasting blood glucose level (5.84 ± 0.65) | | | |

## CONCLUSION AND RECOMMENDATIONS:

There is need to integrate nutrition counseling, micronutrient promotion, and continued monitoring of hematologic and immunologic status into HIV care services to optimize long-term health outcomes in this population.

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**Theme/sub-theme**:Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title**:Nutrition Knowledge, Dietary Patterns and Anthropometric Status Among Adult Patients Attending the Federal University Teaching Hospital, Owerri, Imo State

**Name of Author(s)**: *Ukwujiagu,C.U.[1],Ukozor,A.U.C.[1] and Okwulehie,F.C.

**Affiliation of Author(s)**: [1]Department of Home Economics and Hospitality Management, Alvan Ikoku Federal University of Education, Owerri;

*Corresponding author,e-mail:aucukozor@gmail.com,+2348037760255

**Keywords**: Nutrition Knowledge, Obesity, Relationship

**Highlights**

- More than half of the respondents had good nutrition knowledge.
- 33.6%, 42.6% and 11.2% were overweight, obese or morbidly obese respectively.
- A significant association (p=0.046) exists between gender and anthropometric status;the female counterparts were found to be more obese and overweight.

**Background and Objectives:** This study examined nutrition knowledge, dietary patterns, dietary diversity, and anthropometric status among obese patients attending the Federal University Teaching Hospital, Owerri, with emphasis on the relationships among these variables. Nutrition knowledge is important for promoting healthy dietary practices and maintaining normal body weight; however, obesity remains a major public health concern globally and in Nigeria, where unhealthy diets and sedentary lifestyles contribute to its increasing prevalence.

**Materials and Methods**: A cross-sectional survey design was used for the study. A total of 223 purposively selected respondents participated. Ethical approval and informed consent were obtained before data collection. A structured questionnaire was validated by experts and pretested among a comparable population, yielding a Cronbach's alpha reliability coefficient of 0.84. Information on socio-demographic characteristics, nutrition knowledge, and dietary patterns was collected using the questionnaire, while dietary intake was assessed through a 24-hour dietary recall and food frequency questionnaire. Standard anthropometric procedures were used to determine body mass index and related indicators. Data were analysed using SPSS version 22, with descriptive statistics and Chi-square analysis applied at a significance level of $p < 0.05$.

**Results and Discussion:** The findings showed that more than half of the respondents had good nutrition knowledge, suggesting a reasonable awareness of healthy eating practices. Nevertheless, overweight and obesity were common among the respondents. Female respondents were more frequently represented in the overweight and obesity categories than males. Gender was significantly associated with BMI category in the unadjusted analysis ($\chi^2 = 11.280$, df = 5, p = 0.046). This finding indicates an association between sex and BMI category within the study population but does not establish that female sex caused overweight or obesity.

Good nutrition knowledge did not necessarily translate into healthy weight status. However, the cross-sectional design precludes causal inference, and other potential influencing factors were not independently assessed.

**Conclusion and Recommendations:** Overweight and obesity were common despite generally favourable nutrition-knowledge scores, and female sex was associated with BMI category in the unadjusted analysis. Obesity prevention should therefore combine nutrition education with behavioural, environmental, and appropriate clinical weight-management support. Future longitudinal studies incorporating relevant behavioural, dietary, clinical, and sociodemographic variables, with adequate adjustment for confounding factors, are recommended to clarify the relationships between nutrition knowledge, dietary patterns, and obesity.

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**Theme/sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery

**Title:** Aligning Evidence-Based Nutrition Protocols with Student Health Service Delivery: Insights from Weight Management and Body Image Practices Among University Undergraduates.

**Name of Author (s):** Alagbo P.K.*, Adegoke O., Ogunba B.O.

**Affiliation of Author (s):** [1]Department of Human Nutrition and Dietetics, Obafemi Awolowo University, Ile-Ife, Nigeria

**Corresponding author**: Alagbo P.K **E-mail**: alagbopatiencek@gmail.com, +2348166627548

**Keywords: W**eight management, Nutritional status, Body image, Comorbid conditions.

**Highlights**

- Choice of weight management strategies does not depend on nutritional status
- Body image satisfaction depends on nutritional status
- Active lifestyle influence weight management

**BACKGROUND AND OBJECTİVES:**

Obesity and overweight are a growing health issue, increasing globally with increasing mortality rates in both developed and developing countries [1], whereby patients with obesity and overweight are at the major risk of developing comorbid conditions (CVD, T2DM, gastrointestinal disorders) affecting daily life and increasing mortality with a life expectancy decrease [2]. This study aimed to identify strategies to weight management, determine nutritional status, examine body image satisfaction and determine factors influencing weight management.

**MATERIALS AND METHOD:**

This cross-sectional study design employed multi stage sampling method to obtain data through validated and structured questionnaires with other assessments. Relevant data assessing body image, weight management strategies, nutritional status and other important variables. Data collected from 13 Faculties in Obafemi Awolowo University. Analysis using SPSS version 25.0, IBM for descriptive and inferential statistics, Chi square to test hypothesis.

**RESULTS AND DISCUSSION:**

43.6% eat less fat, 57.7% engage in fasting as major weight management strategies. 53.7% of undergraduates are managing their weights,45.8% are not managing their weights,31.2% have goals of gaining weights,21.4% are losing weight, 46.3% are maintaining their weights. Low subscription to special diet, dietitians and wellness centers. Most practiced weight management strategy are fasting, increasing physical activities, skipping meals, eating less and consuming less calories. 61.7% are moderately satisfied with their looks, 64.2% agreed that active lifestyle is a factor influencing weight management. Proper weight management strategies most often focus on achieving healthy weight through slow but steady weight loss, followed by maintenance of an ideal body weight over time [3]. Nigerian undergraduates are active; the academic setting does not permit sedentary lifestyle.

**CONCLUSION AND RECOMMENDATİON(S):**

Choice of strategies for achieving weight goals include skipping meals, fasting, increasing physical activities while least adopted are bariatric surgery and visiting dietitians. Recommendation:

Increased awareness is needed on the effect of unhealthy weight management practices among undergraduates, electives in the department of Human Nutrition and Dietetics. Enlightenment to undergraduates to visit dietitians in their weight management journey.

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**Theme:** Delivering Better Nutrition for all: Connecting the Dots across Life cycle, Systems & Sectors
**Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery
**Title:** Sensory Evaluation and Proximate Composition of Zobo, Ginger, and Clove-Infused Functional Foods: Implications for Dietary Intervention in Chronic Disease Management
**Name of Author (s):** *Olukogbe, O.O.[1], Mudashiru, K.J.[1], Odumosu, O.[1], Awojobi, A.[1], Thomas, M.[1], Akintola, F.[1], Olateju, O.O.[1]
**Affiliation of Author (s):** [1] Department of Nutrition and Dietetics, Lagos University Teaching Hospital (LUTH).
**Corresponding Author; ***Odumosu, O., e-mail: odumosuoreoluwaadeola@gmail.com, +2348143188732
**Keywords:** Chronic diseases, Functional foods, Sensory evaluation, Hibiscus sabdariffa. **Highlights**

- Muffins showed higher protein, fibre, phenolics and antioxidant activity.
- Energy bars contained higher flavonoid and magnesium contents.
- Muffin sample A1 recorded the highest overall sensory acceptability.

**BACKGROUND AND OBJECTIVES**:
The increasing burden of chronic non-communicable diseases has intensified the need for affordable, culturally acceptable functional foods that support healthy dietary practices. Indigenous botanicals such as *Hibiscus sabdariffa* (zobo), *Zingiber officinale* (ginger), and *Syzygium aromaticum* (clove) possess bioactive compounds with reported antioxidant and anti-inflammatory properties, making them promising ingredients for functional food development. However, evidence on their incorporation into locally acceptable food products with desirable nutritional and sensory qualities remains limited. This study developed zobo-, ginger-, and clove-enriched muffins and energy bars and evaluated their proximate composition, mineral content, bioactive compounds, and sensory acceptability.
**MATERIALS AND METHODS:** A cross-sectional study with muffins and energy bars was conducted using standardised formulations incorporating varying ratios of zobo, ginger, and clove, followed by baking of the muffins at 180°C for 20–25 minutes, after which they were cooled and stored in airtight containers. Proximate composition, mineral composition, and bioactive compounds were analysed using standard methods. Sensory acceptability was assessed among 50 apparently healthy adults using a 5-point hedonic scale. Data were analysed using descriptive statistics, one-way ANOVA, and Tukey's post hoc test at $p < 0.05$.
**RESULTS AND DISCUSSION:** Significant differences ($p<0.05$) were observed among the developed products. Muffins contained higher protein (9.04%), fibre (7.18%), total phenolics (99.03%), and antioxidant activity (256.85%), while energy bars had higher carbohydrate (70.02%), magnesium (15.16%), and total flavonoid contents (81.15%). Sensory evaluation showed that muffin sample A1 was the most preferred, whereas sample B2 received the lowest acceptability score.
These findings suggest that incorporating zobo, ginger, and clove into food products can enhance their nutritional quality, bioactive properties, and consumer acceptability, consistent with previous studies [1–2].

**Table 1: Selected nutritional, bioactive and sensory characteristics of the developed products**

| Parameter | Muffins | Energy Bars |
|---|---|---|
| Protein (%) | 7.21–10.28 | 6.56–8.97 |
| Fibre (%) | 7.02–7.29 | 6.40–6.83 |
| Total phenolics (mg/100 g) | 96.76–102.15 | 82.60–86.93 |
| Total flavonoids (mg/100 g) | 72.85–76.16 | 79.29–83.12 |
| FRAP | 245.88–267.84 | 224.45–230.66 |

**CONCLUSION AND RECOMMENDATION:** The developed muffins and energy bars showed good nutritional quality, beneficial bioactive properties, and were well accepted by consumers. Muffins performed better in protein, fibre, antioxidant activity, and overall acceptability, while energy bars provided more magnesium and flavonoids. These products show promise as locally acceptable functional foods for supporting the dietary management of chronic non-communicable diseases. Future product development should prioritise colour enhancement and assess the impact of particle size reduction on texture.

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# SUB-THEME: INNOVATIONS IN CLINICAL NUTRITION PRACTICE ACROSS THE LIFE CYCLE: ALIGNING EVICENCE BASED PROTOCOLS WITH HEALTH SYSTEM DELIVERY.

## ASSESSMENT OF NUTRITIONAL KNOWLEDGE, DIETARY PATTERNS AND NUTRITIONAL STATUS OF CANCER PATIENTS

Aje, E.A.[1], *Umoh, U.U.[1], Agbakwuru, C.[1], Oshinkanlu, B.[1], Bashir, M.A.[1], Sowunmi, A.C.[1], Ezekiel, S.[1]

[1]MEDSERVE-LUTH Cancer Centre, Lagos University Teaching Hospital, Lagos, Nigeria

*Corresponding author, e-mail: diet.udeme@gmail.com, +2348066222386

**Keywords:** Cancer; Nutrition knowledge; Dietary pattern; Nutritional status

### Highlights

- Good nutrition-prevention knowledge was found in 69.5% of cancer patients
- Malnutrition (MUAC) and central obesity (WHR) were both common findings
- Fruit, vegetable and dairy intake remained low despite good knowledge

### BACKGROUND AND OBJECTIVES

Nutrition is a critical component of comprehensive cancer care, influencing treatment tolerance, recovery, quality of life, and survival [1]. Cancer patients are particularly vulnerable to malnutrition and unhealthy dietary practices, yet evidence on nutrition-related knowledge, dietary patterns, and nutritional status among Nigerian cancer patients remains limited. This study assessed nutrition-related cancer prevention knowledge, dietary patterns, and nutritional status among cancer patients attending MEDSERVE-LUTH Cancer Centre, Lagos, Nigeria.

### MATERIALS AND METHOD

A hospital-based cross-sectional study was conducted among 243 adult cancer patients receiving treatment at MEDSERVE-LUTH Cancer Centre. Data were collected using a structured interviewer-administered questionnaire comprising socio-demographic and clinical characteristics, nutrition-related cancer prevention knowledge based on the World Cancer Research Fund recommendations, and dietary patterns assessed using a Food Frequency Questionnaire. Nutritional status was evaluated using Body Mass Index (BMI), Mid-Upper Arm Circumference (MUAC), and Waist-to-Hip Ratio (WHR) according to World Health Organization criteria. Descriptive statistics summarized the data, while Chi-square tests examined associations between nutritional status and selected socio-demographic and clinical variables at a significance level of $p < 0.05$.

### RESULTS AND DISCUSSION

The mean age of participants was 56.2 ± 10.8 years, and 52.3% were male. Breast cancer was the most common diagnosis (37.0%), followed by prostate (16.9%) and colorectal cancers (14.0%). Nutritional status indicators are summarised in Table 1: 46.5% of participants had normal BMI,

whereas 26.7% were underweight and 26.7% were overweight or obese. Nearly half (47.3%) were malnourished based on MUAC, while 53.5% had central obesity according to WHR, findings broadly consistent with malnutrition rates reported among cancer patients elsewhere [2, 3].

**Table 1: Nutritional Status Indicators of Cancer Patients (n = 243)**

| Indicator | Category | n (%) |
|---|---|---|
| BMI | Underweight | 26.7% |
| | Normal | 46.5% |
| | Overweight/Obese | 26.7% |
| MUAC | Malnourished | 47.3% |
| WHR | Central obesity | 53.5% |

Good nutrition-related cancer prevention knowledge was observed in 69.5% of participants. Dietary assessment showed frequent consumption of cereals, legumes, and fish but relatively low intake of fruits, vegetables, and dairy products. Significant associations were found between nutritional status indicators and selected socio-demographic characteristics ($p < 0.05$). These results suggest that, as observed in other cancer populations, good knowledge does not always translate into optimal dietary practice or nutritional status [4], underscoring the need for structured, individualised nutrition support alongside health education.

## CONCLUSION AND RECOMMENDATION(S)

Although most participants demonstrated good nutrition-related cancer prevention knowledge, malnutrition, central obesity, and inadequate dietary diversity remained common. Routine nutritional screening, individualized dietary counselling, and evidence-based nutrition education should be integrated into oncology care to improve nutritional status and treatment outcomes.

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**Theme/ Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Paper title:** Evaluation of the Anti-Obesity and Anti-Hyperglycaemic Potential of African Bush Mango (*Irvingia gabonensis*) in Obese Wistar Rats

**Names of Authors:** *Edeh, R.I.[1], Obi, J.C.[1] and Agbo, E.C.[1]

**Affiliation of Authors:** [1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka.

***Corresponding Author's e-mail:** raphael.edeh@unn.edu.ng

**Keywords:** Bush mango, obesity, hyperglycaemic.

**Highlights**

- Bush mango was effective in the management of obesity.
- It had positive effects on both body weight and fasting blood glucose in obesity.

## BACKGROUND AND OBJECTIVES

Obesity is one of the leading preventable causes of death worldwide. It is estimated that about 90% of type 2 diabetes mellitus is attributable to excess weight [1]. Plants possess many potentials which can help to manage many diseases and can help in management of obesity. Hence, this study focused on the evaluation of the anti-obesity and anti-hyperglycaemic potential of African bush mango (*Irvingia gabonensis*) in obese Wistar rats.

## MATERIALS AND METHODS

The study which employed experimental design was conducted with 30 adult male Wistar rats and lasted for a period of forty-two (42) days consisting of 5days of acclimatisation, 14 days for obesity induction, 2days for establishment of obesity and 21days feeding on experimental diet. The rats were evenly distributed to five groups of six rats respectively, comprising two control groups (D and E) and three test groups (A, B and C). Obesity was induced in groups A, B, C and D using high fat diets. Groups D (+ve) and E (-ve) were the control groups fed 0mg of bush mango/kg body weight, respectively while groups A, B and C were treated groups fed 1000mg, 3000mg and 5000mg of bush mango/kg body weight daily, respectively with cannula. All the rats received rat chow and water ad libitum for the period of the study. The mean and standard errors of the mean (Means ± SEM) of the data generated was calculated. Data were subjected to Analysis of variance (ANOVA) for separation of mean and Duncan's studentised new multiple range tests to determine which experimental diet is significantly better in relation to the parameters tested at $p<0.05$.

## RESULTS AND DISCUSSION

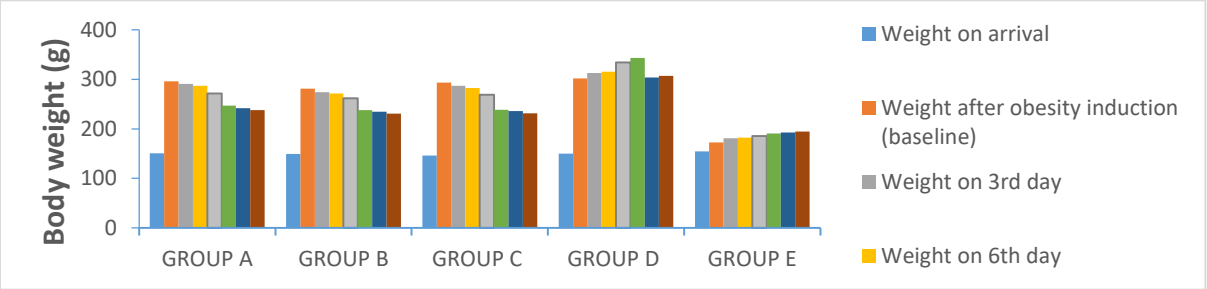



**Fig 1: Mean body weights of the rats (g)**

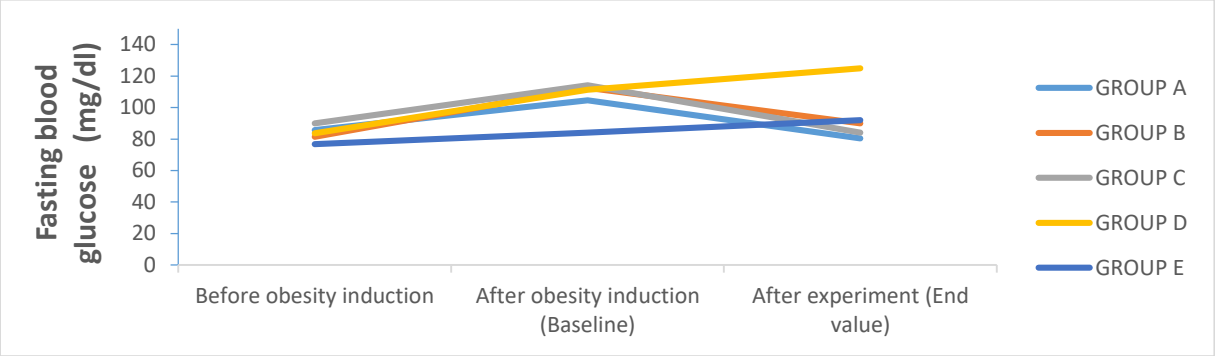



**Fig II: Mean fasting blood glucose (FBG) levels of the rats (mg/dl)**

Key:
Group A: Obese rats fed 1000 mg/kg body weight of fresh bush mango smoothie daily
Group B: Obese rats fed 3000mg/kg body weight of fresh bush mango smoothie daily
Group C: Obese rats fed 5000mg/kg body weight of fresh bush mango smoothie daily
Group D: Obese rats fed 0mg/kg body weight of fresh bush mango smoothie daily (positive control)
Group E: Normal rats fed 0mg/kg body weight of fresh bush mango smoothie daily (negative control)

African bush mango had a dose dependent positive effect in controlling the weight and fasting blood glucose of the obese rats (Fig I and 2). Findings from this study were in line with reports from earlier studies [2].

## CONCLUSION AND RECOMMENDATIONS

African bush mango was effective in the control of obesity and its hyperglycaemic complications, and can be used in the management of obesity and its hyperglycaemic complications. The study can be repeated with humans to determine the corresponding doses that would give same or similar results.

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**Theme/ Sub-theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Paper title:** Prevalence of dyslipidaemia among People Living with Human Immunodeficiency Virus (HIV) in Enugu State.

**Author:** *Edeh, R.I.[1], Nnam, N.M.[1]

**Affiliation of Author:** [1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka.

***Corresponding Author e-mail:** raphael.edeh@unn.edu.ng

**Keywords:** Lipid profile, dyslipidaemia, HIV.

**Highlights**

- Combined dyslipidaemia, particularly low high density lipoproteinaemia and high triglyceridaemia were prevalent among the respondents.
- There was a significant relationship between feeding pattern and triglyceride status ($r=0.393$, $p<0.05$), high density lipoprotein and low density lipoprotein ($r=0.698$, $p<0.01$).

**BACKGROUND AND OBJECTIVES**

Dyslipidaemia in people living with human immunodeficiency virus (PLHIV) may contribute to their increased risk of cardiovascular diseases which is the main cause of high mortality among the patients, even after the gains recorded with the introduction of antiretroviral therapy. Changes in lipid metabolism during HIV-1 infection, are a result of the critical role of cholesterol in the mechanism of HIV-1 replication [1]. Therefore, an early identification and treatment of lipid abnormalities, since they are modifiable cardiovascular risk factors in this vulnerable group are therefore important in reducing the morbidity and mortality due to the virus and the antiretroviral therapy [2]. Nutrition, especially lipid assessment and management need to play an indispensable pivotal role in the care and management of PLHIV. There is therefore need for a routine conscious assessment of the lipid profile of PLHIV, with a view to finding solutions to any anomalies observed before they predispose to cardiovascular complications.

**MATERIALS AND METHODS**

A descriptive cross sectional study design in which 300 PLHIV drawn from the three senatorial zones of Enugu State and who had been on antiretroviral therapy for at least three months was used for the study. A structured questionnaire was used to obtain information on the demographic, lifestyle, medical history and feeding pattern of respondents. Ten percent of the respondents was used for the biochemical assessment of lipid profile. Ethical approval for the study was obtained from Ministry of Health, Enugu while an informed written consent was obtained from each respondent before his/ her participation in the study. Data were analysed using a computer software; Statistical Product for Service Solution, Version 21, and were presented as frequencies, percentages, means and standard deviations. T-test was used to determine the association between two variables while Pearson's correlation was used to determine relationships between variables at $p < 0.05$.

## RESULTS AND DISCUSSION

**Table 1: Mean lipid profile of respondents by gender**

| Variable | Gender | | | t-test, p-value |
|---|---|---|---|---|
| | Male | Female | Group mean | |
| Normal | Mean±SD | Mean±SD | Mean±SD | |
| **Lipid profile** | | | | |
| High density lipoprotein (mg/dl) | ≥ 65 | 23.40±5.68 | 21.38±4.78 | 22.39±5.23 | 0.840, 0.574 |
| Low density lipoprotein (mg/dl) | <100 | 51.40±17.44 | 55.77±18.31 | 53.59±17.88 | -0.492, 0.717 |
| Triglyceride (mg/dl) | <150 | 156.20±25.02 | 152.19±15.49 | 154.20±20.26 | 0.479, 0.177 |
| Total cholesterol (mg/dl) | <200 | 117.60±13.52 | 117.27±10.29 | 117.44±11.91 | 0.063, 0.326 |

SD = Standard deviation

The mean HDL of males and females were below the normal cut-off points while the mean triglycerides for both genders were higher than the cut-off points (Table I). Combined dyslipidaemia had a prevalence of 43.3% among the respondents. Findings from this study were in line with reports from earlier studies [3].

## CONCLUSION AND RECOMMENDATIONS

Combined dyslipidaemia was prevalent among the studied population. Nutrition counselling, routine lipid screening, appropriate dietary management, and integration into HIV care services were recommended to serve as indispensable components of the present management regimen for PLHIV.

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**Theme/Sub-theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, and Sectors. *Sub-theme*: Nutrition Across the Life Cycle (Maternal Nutrition) / Clinical Nutrition Practice

**Full-Course Upfront Distribution as the Key Lever for MMS Adherence in Pregnancy: Lessons from Evidence Action's Operational Feasibility Pilot Study in Nigeria.**

**Name of Author(s):** Edeh, M[1]; Dare, E[1]; Awese, A[1], Adegbile, A[1]; Omotola, O[1]; Adie, G[1], Onyekachi, I[1]; Chime, I[1]; Adeoye, O[1]; Ogunbi, T[1]; Bako-Aiyegbusi, L[3]**;** Newman, S[1]; Chang, R[1]; Haong, C[1], Alarape, K[2] , Ekwueme, C[2]

**Affiliation of Author(s):**

[1]Evidence Action, Nigeria and Washington DC, USA.

[2]Oyo and FCT State Primary Health Care Board, Nigeria

[3]Nutrition Department, Federal Ministry of Health and Social Welfare, Abuja, Nigeria.

**Corresponding author, e-mail:** *Maryann.Edeh@evidenceaction.org ; maryannedeh84@gmail.com, +234 7039149960*

**Keywords:** Multiple micronutrient supplementation; Maternal anemia; Adherence; Nigeria

**Highlights of findings**

- Upfront full-course MMS distribution drove adherence, not reminders
- Full-course uptake rose from 11.3% baseline to >99% in pilot
- A/B test: paper calendars added no significant compliance benefit.

## BACKGROUND AND OBJECTIVES

Only about 8% of pregnant women in low- and middle-income countries complete the recommended 180-tablet course of iron and folic acid (IFA), the standard-of-care antenatal supplement [1]. Multiple micronutrient supplementation (MMS), a single tablet providing 15 micronutrients, outperforms IFA on key maternal and newborn outcomes [2,3]. Evidence on how to operationalize MMS delivery to maximize adherence within routine government antenatal care (ANC) systems in Nigeria has been limited.

In 2023, Nigeria's Federal Ministry of Health and Social Welfare sought local evidence on MMS acceptability ahead of national scale-up. This study evaluated a model dispensing the full MMS course upfront at a woman's first ANC visit alongside two adherence-support packages of differing intensity, to determine the relative contribution of upfront distribution versus support intensity to MMS consumption in a real-world Nigerian ANC setting.

## MATERIALS AND METHOD

A pre-post cohort study was conducted at 90 government ANC facilities across FCT-Abuja and Oyo State, Nigeria, between April 2024 and August 2025. A baseline cohort of 3,184 women receiving standard-of-care IFA was enrolled (April–August 2024), followed by an MMS cohort of 5,305 women (September 2024–August 2025) who received a 180-tablet UNIMMAP-formulation MMS bottle upfront at their first ANC visit, with structured counseling on MMS benefits and adherence.

An embedded A/B test compared two adherence-support packages (45 facilities/arm): Package A (light) — SMS/phone alarm reminders and counseling flip charts; Package B (full) — Package A plus paper take-home calendars. Consumption was measured via bottle-weighing at return visits using a weight-to-tablet conversion chart, not self-report. Health workers received a state-level training-of-trainers cascade, two per facility.

## RESULTS AND DISCUSSION

Average daily doses dispensed rose from 88.5 at baseline to 141.3 in the MMS cohort (+59.7%); total doses dispensed per pregnancy rose 80.7% (Table 1). Average daily doses consumed rose from 76.3 to 115.8 (+51.9%). Nearly all women (>99%) received the full 180-tablet course upfront, versus 11.3% at baseline, confirming fidelity to the upfront-dispensing model. Compliance rose modestly from 79.2% to 82.8% (+3.6pp).

The A/B test found no statistically significant difference in compliance between the light-touch Package A (81.3%) and enhanced Package B (84.2%) arms. Exit interviews identified counseling and knowledge of MMS benefits — not reminder intensity — as the primary drivers of adherence, consistent with formative research at the same facilities showing structural barriers (late ANC attendance, multi-visit refill models) as the dominant constraints on IFA/MMS consumption.

**Table 1: Prophylactic MMS distribution and consumption indicators, baseline versus pilot cohort**

| Indicator | Baseline | Pilot | Change |
|---|---|---|---|
| Average daily doses dispensed during pregnancy | 88.5 | 141.3 | +59.7% |
| Average daily doses consumed during pregnancy | 76.3 | 115.8 | +51.9% |
| Compliance rate (doses consumed / doses dispensed) | 79.2%* | 82.8% | +3.6pp |
| Women receiving the full 180-dose course upfront | 11.3% | >99% | — |

**Baseline compliance relied mainly on self-report; the pilot estimate uses bottle-weighing.*

## CONCLUSION AND RECOMMENDATION(S)

Upfront full-course MMS distribution substantially increased consumption relative to standard-of-care IFA and was the primary driver of improved adherence, outweighing behavioral support intensity. We recommend Nigeria's national MMS scale-up strategy retain upfront full-course dispensing and low-cost counseling (flip charts) as core program components, reserving intensive support for settings where distribution-level gains prove insufficient.

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**Theme/Sub-theme:** Delivering Better Nutrition for All: Connecting the Dots Across Life Cycle, Systems, and Sectors
Sub-theme: Clinical Nutrition Practice / Nutrition Across the Life Cycle (Maternal-Perinatal)

# Strengthening the Anemia Prevent-Test-Treat Cascade in Pregnancy: Findings from Reinforced Testing and Treatment Protocols in Nigerian ANC Facilities

**Name of Author(s):** Edeh, M[1]; Dare, E[1]; Awese, A[1], Adegbile, A[1]; Omotola, O[1]; Adie, G[1], Onyekachi, I[1]; Chime, I[1]; Adeoye, O[1]; Ogunbi, T[1]; Bako-Aiyegbusi, L[3]**;** Newman, S[1]; Chang, R[1]; Haong, C[1], Alarape, K[2] , Ekwueme, C[2]

**Affiliation of Author(s):**
[1]Evidence Action, Nigeria and Washington DC, USA.
[2]Oyo and FCT State Primary Health Care Board, Nigeria
[3]Nutrition Department, Federal Ministry of Health and Social Welfare, Abuja, Nigeria.
**Corresponding author, e-mail:** *Maryann.Edeh@evidenceaction.org ; maryannedeh84@gmail.com, +234 7039149960*
**Keywords:** Anemia in pregnancy; Antenatal care; Care cascade; Nigeria
**Highlights of finding(s):**

- Testing and diagnosis gaps, not just initiation, limit treatment.
- Reinforced training raised first-visit anemia testing to 84.5%
- Nearly half of anemic women were never treated

## BACKGROUND AND OBJECTIVES

Anemia in pregnancy remains a major, under-addressed contributor to maternal mortality: recent trial-based evidence indicates anemia may be responsible for roughly half of severe postpartum hemorrhage cases in sub-Saharan Africa and South Asia, regions where up to half of pregnant women are anemic (1). Despite this burden, anemia testing and treatment have historically received limited programmatic attention within routine Nigerian antenatal care (ANC), where diagnostic capacity and treatment-initiation practices are inconsistent.

As part of a multiple micronutrient supplementation pilot across 90 government ANC facilities in Nigeria, this study reinforced anemia testing and treatment initiation protocols and examined their effect across the full prevent-test-treat cascade. The objective was to determine the effect of reinforced training and supervision on anemia testing, treatment initiation, and the share of anemic women ultimately receiving treatment.

## MATERIALS AND METHOD

A pre-post cohort study was conducted at 90 government ANC facilities across FCT-Abuja and Oyo State, Nigeria (2024–2025). All facilities received reinforced training and supervision on anemia testing (at first, 26-week, and 36-week ANC visits) and treatment initiation, using updated WHO 2024 hemoglobin cutoffs and a combined treatment protocol of daily MMS (30mg iron) plus iron/IFA (60mg iron), totaling 90mg iron/day for mild/moderate anemia.

Cascade analysis modeled the full prevent-test-treat pathway — from estimated anemia prevalence (mild 20.1%, moderate 22.5%, non-anemic 55.0%) through testing, diagnosis, and treatment initiation — comparing the baseline cohort to the post-reinforcement pilot cohort to identify where women were lost at each cascade step.

## RESULTS AND DISCUSSION

First-visit anemia testing rose from 46.2% at baseline to 84.5% following reinforced training and supervision (+38.3 percentage points) (Table 1). Follow-up testing coverage also improved, though gaps remained: 26-week visit testing rose to 65.4%, 36-week visit testing to 53.8%, and testing at return following a positive diagnosis to 66.9%. Treatment initiation among women diagnosed with mild or moderate anemia rose from 13.3% to 74.2% overall (71.4% mild, 83.3% moderate).

Cascade analysis showed that despite these gains, only 46.0% of mildly anemic and 53.8% of moderately anemic women were ultimately initiated on treatment — reflecting compounding losses across the cascade: 15.5% of anemic women were never tested, a further 23.7% of those tested were not diagnosed, and 28.6% (mild) to 16.7% (moderate) of diagnosed women were not initiated. Reinforced protocols narrowed individual cascade gaps substantially, but cumulative losses across testing, diagnosis, and initiation still left roughly half of anemic women without treatment.

**Table 1: Anemia testing and treatment cascade indicators, baseline versus pilot cohort**

| Indicator | Baseline | Pilot (Reinforced Training) |
|---|---|---|
| First-visit anemia testing rate (%) | 46.2%† | 84.5% |
| Treatment initiation rate among diagnosed women, mild/moderate anemia (%) | 13.3%† | 74.2% |
| Mildly anemic women ultimately initiated on treatment (% of all mildly anemic) | 3.8% | 46.0% |
| Moderately anemic women ultimately initiated on treatment (% of all moderately anemic) | 8.2% | 53.8% |

*†Baseline data are from a separate facility assessment, not the pilot's own baseline dataset.*

## CONCLUSION AND RECOMMENDATION(S)

Reinforced testing and treatment protocols substantially improved individual steps of the anemia prevent-test-treat cascade in a 90-facility Nigerian pilot, but compounding losses across testing, diagnosis, and initiation left roughly half of anemic women without treatment. We recommend Nigeria's ANC anemia management strategy adopt cascade-wide monitoring — tracking testing, diagnosis, and initiation together, rather than single-indicator targets — and sustain reinforcement of follow-up testing and diagnostic accuracy alongside first-visit testing gains.

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**Title:** Delayed Healthcare-Seeking Behaviour and a Context-Specific Decision-Support Framework for Strengthening IMAM Implementation among Caregivers of Children with Severe Acute Malnutrition in Kaduna State, Nigeria

**Name of Author(s):**
Muhammad Tukur[1], Chinwe Ezife[2], Bello Yusuf Jamoh[3], Ramatu Musa Haruna[1], Ahmad Mahmud[1], Adamu Muhammad Usman[2]

**Affiliations:**
[1]Department of Nutrition Services, Kaduna State Primary Health Care Board, Kaduna State, Nigeria
[2]UNICEF Kaduna Field Office, Kaduna State, Nigeria
[3]Office of the Executive Secretary, Kaduna State Primary Health Care Board, Kaduna State, Nigeria

**Corresponding Author:** Muhammad Tukur, Department of Nutrition Services, Kaduna State Primary Health Care Board, Kaduna State, Nigeria. Mabuahmad1978@gmail.com 08035562762

**Keywords:** Severe Acute Malnutrition; Healthcare-Seeking Behaviour; Integrated Management of Acute Malnutrition; Caregivers; Kaduna State

**Highlights**

• Delayed healthcare-seeking among caregivers may contribute to late presentation of children with severe acute malnutrition and poorer treatment outcomes.

• Caregiver, household, community and health-system factors were associated with delayed healthcare-seeking among children with severe acute malnutrition.

• The study developed a context-specific decision-support framework linking these factors with treatment outcomes to strengthen Integrated Management of Acute Malnutrition programme implementation.

**BACKGROUND AND OBJECTIVE:**

Severe acute malnutrition (SAM) remains an important cause of preventable illness and death among children aged 6–59 months in Nigeria despite the expansion of Integrated Management of Acute Malnutrition (IMAM) services across Kaduna State. Early identification and appropriate management are essential to reduce complications and improve treatment outcomes. [1]

This study assessed the impact of delayed healthcare-seeking behaviour and developed a context-specific decision-support framework linking caregiver, household, community and health-system factors to strengthen IMAM programme implementation among caregivers of children aged 6–59 months with severe acute malnutrition attending IMAM centres in Kaduna State.

**METHOD:**

A facility-based analytical cross-sectional mixed-methods design was adopted involving 360 caregivers selected through multistage sampling, while key informant interviews were conducted with programme managers and healthcare workers. Quantitative data were analysed using descriptive statistics, Chi-square

tests and multivariable logistic regression at a 5% level of significance, whereas qualitative data were analysed thematically.

## RESULT AND DISCUSSION:

The findings revealed that 65.3% of caregivers delayed seeking healthcare for their children, while 34.7% presented early. Delayed healthcare-seeking was significantly associated with low educational attainment ($p<0.001$), poor household income ($p=0.002$), cultural beliefs ($p=0.001$), transportation barriers ($p<0.001$), long distance to health facilities ($p=0.003$), limited caregiver decision-making autonomy ($p=0.012$), prolonged waiting time and inconsistent availability of Ready-to-Use Therapeutic Food ($p<0.05$). Children whose caregivers delayed presentation were more likely to present with severe wasting, bilateral oedema and other medical complications, resulting in poorer treatment outcomes and prolonged recovery. The study contributes to knowledge by developing an integrated evidence-based framework that combines Andersen's Behavioural Model, the Three Delays Model, the Health Belief Model and the Social Ecological Model to explain delayed healthcare-seeking among caregivers of children with SAM[2]. The major innovation of the study is the development of a context-specific decision-support framework linking caregiver, household, community and health-system factors with treatment outcomes to strengthen IMAM programme implementation.

Table: Bivariate Analysis of Factors Associated with Delayed Healthcare-Seeking Behaviour among Caregivers of Children with Severe Acute Malnutrition (n = 335)

| Independent Variable | $\chi^2$ | Df | p-value | Statistical Decision |
|---|---|---|---|---|
| Educational level | 4.21 | 1 | 0.040 | Significant |
| Monthly household income | 23.21 | 4 | <0.001 | Significant |
| Distance to IMAM centre | 38.69 | 3 | <0.001 | Significant |
| Knowledge score on SAM | 245.53 | 2 | <0.001 | Significant |
| Ownership of transport | 115.08 | 5 | <0.001 | Significant |
| Decision-making autonomy | 261.18 | 3 | <0.001 | Significant |

Level of significance: $\alpha = 0.05$

## CONCLUSION AND RECOMMENDATION(S):

The study recommends strengthening community-based nutrition education, behaviour change communication, women's decision-making capacity, referral and transportation systems, uninterrupted supply of Ready-to-Use Therapeutic Food and community-led early case detection to improve timely healthcare-seeking, enhance recovery and reduce child mortality associated with severe acute malnutrition in Kaduna State.

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# SUB-THEME 7: ORAL

**Theme/Sub Theme: Transforming Local Food Systems for Improved Food Security and Nutrition.**

## Production and Essential Amino Acid Profile Evaluation of Instant *Kunun Alkama* (wheat) Flour Fortified with Groundnut and Date Palm Fruit Flour Mix

Maude, M.M; Abdulkadir, F; Kolo, S.I; Bagirei, S.Y; Saidu, B.A; Shehu, A.A.
[1]Department of Food Science and Technology, Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria.
Corresponding Author Email: mmmaryam@ibbu.edu.ng (07038375355)
Co-Authors Email:fabdulkadir@ibbu.edu.ng;salamatuk@ibbu.edu.ng; sybagirei@ibbu.edu.ng; bintaa@ibbu.edu.ng; adamushehu@ibbu.edu.ng.

**Keywords**: *Kunun Alkama, Fortification, Amino Acids.*

### Background and Objectives

*Kunun* is a traditional non-alcoholic beverage widely consumed in Nigeria, particularly in the northern region. It is primarily cereal-based, with varieties such as *kunun alkama* (wheat), *kunun shinkafa* (rice), and *kunun zaki* (millet). Among these, *kunun alkama* is highly valued for its carbohydrate content and used as a weaning food for infants, as well as a nourishing meal for the adult, elderly and convalescents. However, traditional cereal-based gruels are often characterized by low protein density contributing to protein-energy malnutrition (PEM) in developing nations (1). There is a critical need to develop instant, shelf-stable *kunun alkama* flour mixes that are fortified with high-protein legumes and natural sweeteners to enhance both nutritional quality and consumer convenience.

### Materials and Methods

Wheat, groundnuts, and date palm fruits were sourced from Badeggi market in Lapai, Niger State, Nigeria. The materials were cleaned, sorted, and processed. Wheat was milled to flour. Groundnut seeds were soaked in boiling water for 3mins, drained and oven dried after which the skin was removed using the finger and milled to flour. Date palm fruits were de-seed, oven dried and milled to flour. Four composite flour blends were developed: Sample A (100%:0%:0%), Sample B (65%: 15%:20%), Sample C (60%:20%:20%), and Sample D (70%:10%:20%) of wheat, groundnut and

date palm fruit respectively. Amino acid profile was analyzed as described by (2) using a hydrolyzed and evaporated in a rotatory evaporator then injected into the Technicon sequential multisampling Amino Acid Analyzer. All experiments were performed in triplicate. Data collected were subjected to analysis of variance using SPSS version 20.0 statistical package.

**Results and Discussions**

The amino acid profile (Table 1) indicated that Sample C consistently exhibited the highest levels of essential amino acids, including Lysine (4.37 mg/g), Leucine (8.93 mg/g), and Phenylalanine (5.57 mg/g) demonstrating a robust nutritional composition that addresses the inherent deficiencies of wheat-based diets making it a promising functional food thereby, meeting the dietary requirements for essential amino acids.

**Table 1: Essential Amino Acid Profile (mg/g protein) of Instant *Kunun Alkama* Mix.**

| Amino Acid | Sample A | Sample B | Sample C | Sample D |
|---|---|---|---|---|
| Lysine | 3.77±0.01$^{d}$ | 4.00±0.00$^{c}$ | 4.37±0.01$^{a}$ | 4.06±0.00$^{b}$ |
| Methionine | 1.67±0.01$^{d}$ | 1.93±0.00$^{c}$ | 2.82±0.01$^{a}$ | 2.34±0.01$^{b}$ |
| Threonine | 1.95±0.00$^{d}$ | 2.87±0.01$^{c}$ | 4.66±0.01$^{a}$ | 3.84±0.01$^{b}$ |
| Isoleucine | 4.00±0.00$^{b}$ | 4.00±0.00$^{b}$ | 4.24±0.01$^{a}$ | 4.01±0.01$^{b}$ |
| Leucine | 7.78±0.01$^{d}$ | 8.26±0.01$^{c}$ | 8.93±0.00$^{a}$ | 8.78±0.01$^{b}$ |
| Phenylalanine | 3.95±0.00$^{c}$ | 3.95±0.01$^{c}$ | 5.57±0.01$^{a}$ | 4.87±0.01$^{b}$ |
| Valine | 4.23±0.01$^{d}$ | 4.32±0.01$^{c}$ | 4.96±0.01$^{a}$ | 4.74±0.01$^{b}$ |
| Tryptophan | 3.66±0.01$^{d}$ | 4.45±0.00$^{c}$ | 5.36±0.01$^{a}$ | 4.71±0.01$^{b}$ |
| Histidine | 2.57±0.02$^{d}$ | 3.28±0.01$^{c}$ | 3.86±0.01$^{a}$ | 3.70±0.00$^{b}$ |

**Conclusion and Recommendation**

This study successfully developed an instant *kunun alkama* flour mix. The results demonstrate that fortification significantly improves the protein content and amino acid profile of the beverage.

Sample C was identified as the most nutritionally superior formulation. It is recommended that food processing industries adopt its commercial production.

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**Theme/sub-theme:** Fostering Innovation, Policy Coherence, and MultiSectoral Partnerships

**Title:** Policy Implications and Successes of Infant and Young Child Feeding Practices in Southwest Nigeria: A Systematic Review

**Name of Author(s):** *Adekanmbi, T.E.[1], Ogunjinmi K.[1], Amoke R.I.[1] Onuoha, M.*

**Affiliation of Author(s):** [1]Department of Human Nutrition and Dietetics, Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti, Ekiti State, Nigeria

***Corresponding author**, e-mail: adekanmbi.tobiloba@bouesti.edu.ng, +2348160056015*

**Keywords:** Infant and Young Child Feeding, Exclusive Breastfeeding, Nutrition Policy, Southwest Nigeria

**Highlights** •14.2% increase in exclusive breastfeeding rates in Southwest Nigeria from

• Alive & Thrive and UNICEF C-IYCF programmes significantly improved EBF and EIBF, especially in urban Lagos

• There is Urban-rural disparities due to weak enforcement, short maternity leave and funding gaps

**BACKGROUND AND OBJECTIVES:** Optimal Infant and Young Child Feeding (IYCF) practices are essential for reducing malnutrition and under-five mortality in Southwest Nigeria (Lagos, Ogun, Oyo, Osun, Ondo, Ekiti) [1, 3]. Despite the 2010 National Policy on IYCF, BFHI, and state-level interventions, urban-rural disparities remain significant. This systematic review assessed IYCF policy frameworks, intervention successes, implementation gaps, and provided recommendations to improve practices and reduce inequities in the region.

**MATERIALS AND METHOD:** A systematic search was conducted in PubMed, CENTRAL, Scopus, and grey literature from January 2010 to December 2024. Thirty-two studies (20 quantitative, 8 qualitative, 4 mixed-methods) met inclusion criteria. Data on policy implementation, intervention outcomes (EBF, EIBF, MDD, MMF), and barriers were extracted. A random-effects meta-analysis of 8 studies for EBF outcomes was performed using R software. Subgroup analysis (urban vs rural) and narrative synthesis were conducted.

**RESULTS AND DISCUSSION:**

**Table 1: Summary of Key IYCF Intervention Successes in Southwest Nigeria**

| Intervention | Region | Outcome | Impact (95% CI) |
|---|---|---|---|
| Alive & Thrive | Lagos | EBF | +8.9 pp (OR 1.48, 1.15–1.90, p=0.002) |
| Alive & Thrive | Lagos | EIBF | +11.0 pp (OR 1.70, 1.30–2.22, p<0.001) |
| UNICEF C-IYCF | Oyo | EBF | +10.2 pp (OR 1.55, 1.10–2.18, p=0.012) |
| Community Training | Osun/Oyo | MMF | +15.8% (10.5–21.1) |

Meta-analysis showed a statistically significant pooled increase in exclusive breastfeeding of **14.2%** (95% CI: 9.8–18.6, $I^2 = 58\%$, $p < 0.001$). Urban areas recorded significantly higher gains (16.5%, 95% CI: 11.2–21.8) than rural areas (10.8%, 95% CI: 6.0–15.6).

**Barriers to Implementation**

Major barriers included weak enforcement of the International Code of Marketing of Breast-milk Substitutes (OR: 2.10, 95% CI: 1.60–2.76, $p < 0.001$), short maternity leave reducing EBF odds (OR: 0.68, 95% CI: 0.50–0.92, $p = 0.013$), poor funding, and cultural practices (e.g., grandmother-led supplementation, OR: 1.85, 95% CI: 1.35–2.53, $p < 0.001$) [3, 4, 10].

**CONCLUSION AND RECOMMENDATION(S):** IYCF policies in Southwest Nigeria achieved a statistically significant 14.2% pooled increase in exclusive breastfeeding, with stronger gains in urban Lagos. However, urban-rural disparities, weak enforcement, short maternity leave, and funding continue to limit progress.

**Recommendations:** Establish enforcement of the International Code of Marketing of Breast-milk Substitutes, standardize six-month maternity leave across states, scale-up Community-IYCF programmes to rural areas, improve digital monitoring systems, and increase health sector funding.

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1. **Sub-theme:** Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade)

**Title:** A Narrative Review of Trends and Challenges in the Home-Grown School Feeding Programme in Nigeria.

**Name of Author(s):** Akinade E. Ogunniyi[1]*, Ademola O. Adesanya[1], Ifeoluwanimi A. Bolarinwa[1], Peace O. Ogunrinde[1], Tomilola O. Aluko[1], Folashade R. Sikiru[2], Fatimah O. Gbadamosi[3], and Eunice A. Olorunfemi[4]

**Affiliation of Author(s):** [1] Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria
[2] Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture Abeokuta, Ogun State, Nigeria
[3] Department of Nutrition and Food Sciences, Faculty of Agricultural and Food Sciences, American University of Beirut, Lebanon
[4] Department of Human Kinetics and Health Education, Faculty of Education, University of Lagos, Lagos, Nigeria

**Correspondence:** enochakinade4@gmail.com

**Keywords:** Home-Grown School Feeding Programme, school feeding, Nigeria, nutrition-sensitive social protection, child nutrition.

**Highlights**

- Nigeria's HGSFP improves school enrolment and attendance where delivery is consistent.
- Nutrition gains are possible, but evidence remains uneven across states.
- Local procurement can strengthen smallholder farmer and vendor livelihoods.
- Funding delays, weak monitoring, corruption, and inequitable coverage threaten sustainability.

**Background and Objectives:** School feeding programmes are increasingly recognised as nutrition-sensitive social protection interventions that can reduce hunger, improve school participation, and stimulate local food systems. In Nigeria, the Home-Grown School Feeding Programme (HGSFP) was designed to provide meals to public primary school pupils while linking food procurement to local farmers and vendors [1]. However, programme performance has varied substantially across states. This narrative review examined trends, regional variations, achievements, and implementation challenges of the HGSFP in Nigeria.

**Materials and Method:** A qualitative, non-systematic narrative review was conducted using evidence from peer-reviewed studies and relevant policy or technical documents on Nigeria's school feeding programme. The review synthesised nine empirical peer-reviewed studies and three policy/technical documents. Evidence was organised thematically around educational outcomes, nutritional and health outcomes, agricultural/economic linkages, and governance, funding, and implementation challenges.

**Results and Discussion:** Across reviewed evidence, the HGSFP was associated with improved enrolment, attendance, and pupil participation where delivery was consistent. Nutritional benefits were reported in

some settings, including modest improvements in anthropometric outcomes and meal contributions to nutrient intake, although dietary adequacy and micronutrient evidence remain limited. The programme also created livelihood opportunities for cooks, vendors, and smallholder farmers through local procurement [2]. Nevertheless, recurrent implementation weaknesses including irregular funding, poor monitoring, inadequate food quality control, corruption, inflationary pressure, weak infrastructure, and inequitable coverage limited programme efficiency and sustainability.

**Conclusion and Recommendation:** Nigeria's HGSFP remains a promising platform for linking education, nutrition, agriculture, and social protection, but its impact is highly dependent on governance quality and implementation continuity. Strengthening the programme requires a clear legal framework, inflation-adjusted feeding allocations, reliable federal-state co-financing, digitised beneficiary and vendor monitoring, stronger menu standards, community-based accountability, and national evaluation systems that measure educational, nutritional, and livelihood outcomes. Future research should quantify nutritional outcomes nationally and examine policy strategies for equitable, transparent, and sustainable school feeding implementation in Nigeria.

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| | |
|---|---|
| **Sub Theme 7:** | **Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade)** |
| **Title:** | From evidence to action: How the findings from a stock-taking exercise are shaping strategic planning and strengthening policy coherence |
| **Name of Author (s):** | Idoko, K.[1], Omodieke, A. [1], Ogundeji. Y. [1], Wieland, J.[2], Zaki, Y. [2], Sherif, H. [2] |
| **Affiliation of Author (s):** | [1]Finance Capacity Development Platform, [2]Health Strategy and Delivery Foundation, *Kimberly.idoko@hsdf.org.ng. +2347038993750 |
| **Keywords:** | Multisectoral Nutrition, Nutrition Policy, Nutrition Governance, Implementation Research |

**Highlights:**

- Stock-taking evidence is informing development of NMPFAN 2026–2030
- Weak financing and accountability limit multisectoral nutrition action
- Mixed-methods assessment enabled evidence-informed nutrition planning

**Background**

Delivering improved nutrition outcomes requires coherent policies, sustainable financing, and effective collaboration and governance across sectors. In Nigeria, the National Multisectoral Plan of Action for Food and Nutrition (NMPFAN) provide a framework for coordinated action across health, agriculture, education, environment, social protection, and related sectors [1]. As the 2021–2025 NMPFAN reached the end of its implementation cycle, a targeted national stock-taking exercise was undertaken to assess progress, identify implementation bottlenecks, generate evidence of implementation, strengthen policy coherence, and inform the design of the next NMPFAN (2026–2030). [2]

**Methods**

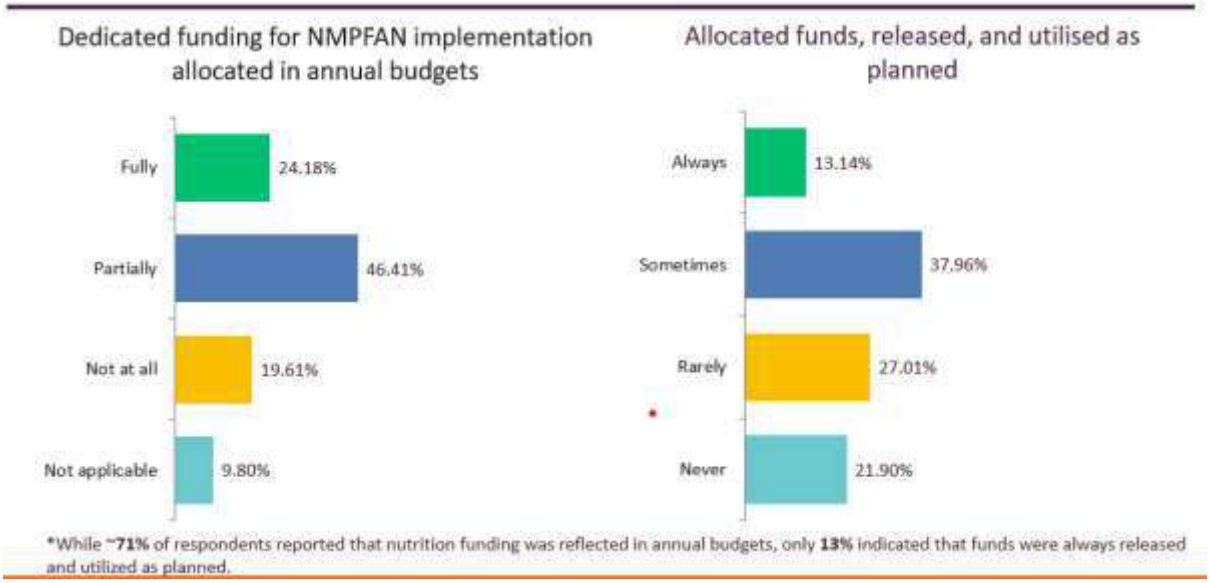
A mixed-methods approach, including a structured desk review, a rapid stakeholder survey (n=154), and key Informant Interviews (KIIs), was employed. Key stakeholders included respondents from the health, agriculture, education, social protection, finance, environment, and WASH sectors spanning all 36 states and the Federal Capital Territory, as well as development

partners and civil society. Quantitative data were analyzed descriptively, and qualitative findings were thematically synthesized to triangulate system-wide performance.

**Results**

The assessment showed that nutrition has gained visibility across sectors, with multisectoral coordination structures established in most states. However, implementation remains constrained by weak financing and accountability mechanisms. Only 71% of respondents reported dedicated nutrition budget lines, while just 13% indicated that allocated funds were consistently released and utilized as planned.

**Figure 1: Respondent report on NMPFAN budgets and releases**




Coordination platforms varied significantly in functionality, and key challenges included unclear financing responsibilities, weak monitoring and reporting systems, and limited subnational ownership.

Beyond identifying implementation gaps, the evidence generated through the stock-taking is currently informing the development of Nigeria's 2026–2030 NMPFAN. Specifically, the findings are guiding the prioritization of strategic interventions and shaping discussions on governance arrangements, financing approaches, implementation responsibilities, monitoring and accountability mechanisms, and strategies to strengthen subnational ownership and multisectoral coordination. The assessment has also provided a common evidence base for government, development partners, civil society, and academia, supporting a more coherent, implementation-focused planning process.

## Conclusion

This study demonstrates the value of institutionalized learning and evidence-informed planning in strengthening nutrition governance. The key lesson is that multisectoral nutrition strategies succeed not only through sound design but through clear financing arrangements, accountability systems, and subnational ownership. By using stock-taking findings to shape the next national nutrition strategy, Nigeria provides a practical example of how countries can improve policy coherence, strengthen multisectoral partnerships, and translate nutrition commitments into sustained action and impact.

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**Theme/Sub-theme:** Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships

# Anthropometric Status and Dietary Practices Among Bank Workers in Jos North Local Government Area, Plateau State, Nigeria

***Akosile B.A.[1] and Ogenyi P.O.[2]**

[1]Department of Nutrition and Dietetics, College of Medicine and Health Allied Science, Nasarawa State University, Keffi, Nigeria

[2]Department of Biochemistry, Faculty of Life Sciences, Ahmadu Bello University, Zaria, Nigeria

Corresponding author, e-mail: akosilebabafemi77@gmail.com, +2348109928115

**Keywords**: *Anthropometry; Dietary practices; Body Mass Index; Bank workers.*

**Highlights**

- BMI rose significantly with carbohydrate, protein, K, Ca and vitamin D intake
- Frequent stair use was linked to lower BMI among bank workers

## BACKGROUND AND OBJECTIVES

Bank workers face occupational conditions, prolonged sitting, high job-related stress and limited time for meal preparation that predispose them to poor dietary practices and non-communicable diseases such as obesity, hypertension and diabetes [1]. Overweight and obesity have risen sharply worldwide, with a large share of adults in Sub-Saharan Africa affected [5], yet locally generated evidence on the nutritional status of bank workers in Jos North Local Government Area (L.G.A.), Plateau State, remains limited. This study assessed the nutritional status of salary earners in banks within Jos North L.G.A. and examined factors associated with overweight and obesity, including socio-demographic characteristics, anthropometric indices, dietary practices, and the relationship between these variables.

## MATERIALS AND METHOD

A descriptive cross-sectional survey was conducted among 118 randomly selected salary earners drawn from banks in Jos North L.G.A. Data were obtained using a semi-structured questionnaire adapted from the WHO STEPwise instrument, covering socio-demographic information, food consumption frequency, dietary practices and physical activity. Weight and height were measured with a digital weighing scale and a stadiometer, and BMI was calculated and classified using WHO reference standards. Data were analyzed descriptively and inferentially using SPSS version 23, with significance set at $p \leq 0.05$.

## RESULT AND DISCUSSION

Respondents were fairly evenly distributed by sex (50.8% female, 49.2% male), mostly aged 30-39 years, single (57.6%) and holders of a bachelor's degree (67.8%). All respondents (100%) were aware of the nutritive value of foods, with no significant sex difference in nutrition knowledge or eating practices. Commonly adopted dietary practices included skipping breakfast, eating at work,

buying food from bank canteens or vendors, frequent snacking, and daily soft-drink intake, consistent with earlier reports on occupational groups with demanding schedules [2, 4].

**Table 1: Mean weight, height and BMI of respondents**

| Parameter | Mean ± SD | Minimum | Maximum |
|---|---|---|---|
| Weight (kg) | 70.06 ± 9.41 | 50.0 | 90.0 |
| Height (m) | 1.68 ± 0.09 | 1.50 | 1.98 |
| BMI (kg/m²) | 24.95 ± 3.76 | 15.30 | 34.11 |

As shown in Table 1, mean BMI was 24.95 ± 3.76 kg/m² (range 15.30-34.11), within the normal range. BMI rose significantly with higher intake of carbohydrate, protein, potassium, calcium and vitamin D ($p < 0.05$), while fat/oil and fortified-food intake showed inconsistent, non-significant associations ($p > 0.05$). Respondents who slept over 8 hours, were female, or married tended toward higher BMI, whereas frequent stair use was linked to lower BMI, reflecting the protective effect of moderate activity against sedentary occupational risk [3].

## Conclusion and Recommendation

Bank workers in Jos North L.G.A. are aware of the nutritive value of foods but show dietary practices, sedentary tendencies and sleep patterns that raise their risk of overweight, obesity and related non-communicable diseases. Nutrition information should be displayed within bank premises, and nutrition education, counselling and workplace wellness programmes organized with health authorities and employers to help workers translate knowledge into healthier practices, including regular stair use and adequate sleep.

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**Theme/Sub-theme:** Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships

**Title:** Perceptions of Religious Leaders on Bible-Based Breastfeeding Counseling in Ibadan, Nigeria

**Name of Author(s):** *Idowu, K.A.[1]

**Affiliation of Author(s):** [1]Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria

*Corresponding author, e-mail: kennyidowu444@gmail.com, +2348139364610

**Keywords:** Religious leaders; Breastfeeding; Counseling; Perception

**Highlights**

- Only 39.3% of marriage counselors included breastfeeding in premarital sessions.
- 96.4% of respondents agreed that churches have a role in promoting breastfeeding.
- Expert-church leader collaboration can strengthen infant nutrition interventions.

## BACKGROUND AND OBJECTIVES

Breastfeeding is recognized globally as a life-saving and cost-effective intervention to reduce childhood morbidity and mortality [1,2]. Despite this, breastfeeding practices in Nigeria remain suboptimal, with exclusive breastfeeding rates far below the WHO 2025 target [3]. Religion is a strong determinant of health-seeking behavior, and religious leaders are influential in shaping cultural norms [4]. This study therefore assessed the perceptions of religious leaders in Ibadan towards incorporating Bible-based breastfeeding counseling into marriage counseling programs.

## MATERIALS AND METHOD

The study employed a cross-sectional design involving 28 members of marriage committees across 10 purposively selected church denominations in Ibadan. A semi-structured, interviewer-administered questionnaire was used to assess socio-demographic characteristics, breastfeeding knowledge, and current practices in marriage counseling. Respondents were subsequently exposed to a PowerPoint presentation on Bible-based breastfeeding education, after which their perceptions were reassessed. Data were analyzed using SPSS version 25.0 and presented using descriptive statistics.

## RESULTS AND DISCUSSION

All respondents discussed at least one health-related topic during marriage counseling, most commonly blood group/genotype and blood-related diseases; breastfeeding was the least frequently discussed topic, raised by only 39.3% of respondents (Figure 1). Further probing showed that while 92.9% of respondents considered it necessary to discuss breastfeeding during marriage counseling and 89.3% believed it should be discussed in church, only 35.7% specifically addressed exclusive breastfeeding and 42.9% were unfamiliar with Biblical references on

breastfeeding (Figure 2). This gap between perceived necessity and actual practice suggests that religious leaders are receptive to, but under-resourced for, delivering breastfeeding counseling.

While 75% of participants demonstrated good baseline breastfeeding knowledge, only 28.6% had ever received breastfeeding education from the church. After exposure to Bible-based breastfeeding education, nearly all respondents (96.4%) strongly perceived that churches have a vital role to play in promoting breastfeeding and expressed willingness to include it in their counseling sessions, with the majority also supporting collaboration with breastfeeding experts to deliver church-based education. These findings highlight the potential of leveraging the influence of religious leaders to improve breastfeeding practices through culturally and spiritually relevant messages.

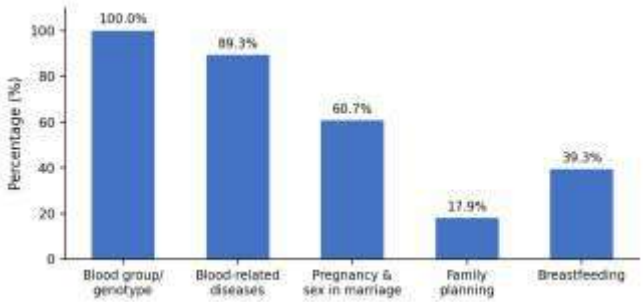



**Figure 1: Health-Related Topics Discussed during Marriage Counseling**




**Figure 2: Breastfeeding-Related Discourse in Marriage Counseling**

## CONCLUSION AND RECOMMENDATION(S)

The study reveals that religious leaders are willing and capable partners in promoting optimal breastfeeding practices through marriage counseling when equipped with Bible-based education. It is recommended that health professionals collaborate with churches to integrate breastfeeding counseling into premarital programs, using Biblical references to reinforce acceptance and sustainability.

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**Sub-Theme:** Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships.

**Title: Validity and Reliability of the Nigerian Revised General Nutrition Knowledge Questionnaire among University Students in Ibadan, Oyo State, Nigeria**

**Name of Authors: Oluyemisi F. Folasire, Bosede O. Adebayo-Oke, Arabambi, O.A.**

*Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Ibadan, Oyo State, Nigeria.*

**Corresponding Author: Arabambi, O.A**

**Email:** arabambioyedotun2044@gmail.com Tel:+234 913 591 5501

**KEYWORDS:** Nutrition knowledge; Instrument validation; Young adult; Psychometric properties.

**Highlights**

- The adapted Nigerian GNKQ-R showed strong content validity and excellent reliability.
- The instrument successfully differentiated students by nutrition background.
- The adapted Nigerian GNKQ-R revealed moderate nutrition knowledge among students (mean score: 61.14 ± 17.02).

## BACKGROUND AND OBJECTIVES

Adequate nutrition knowledge is a critical determinant of healthy dietary behaviours and long-term health outcomes, particularly among young adults exposed to unhealthy food environments and undergoing lifestyle transitions [1]. However, in Nigeria, few culturally appropriate and validated tools exist for assessing nutrition knowledge. This study aimed to validate the General Nutrition Knowledge Questionnaire (GNKQ) among Nigerian undergraduates [2, 3].

## MATERIALS AND METHODS

A cross-sectional validation study was conducted to assess the validity and reliability of the culturally adapted General Nutrition Knowledge Questionnaire (GNKQ) among 385 Nigerian undergraduates aged 18–30 years, selected via multistage sampling from two tertiary institutions in Ibadan, Oyo State. Data were collected using a structured, self-administered adapted GNKQ questionnaire that assessed dietary recommendations, food groups, healthy choices, and diet–disease relationships. Content validity was established through expert review for cultural relevance and clarity. Construct validity was evaluated using known-groups comparison, while internal consistency reliability was assessed with Cronbach's alpha [3]. Descriptive statistics summarised participant characteristics and knowledge scores; independent t-tests and one-way ANOVA examined differences across demographic groups.

## RESULTS AND DISCUSSION

Content validity assessment showed that questionnaire items were relevant and culturally appropriate (S-CVI = 0.81). Reliability analysis revealed an overall acceptable internal consistency for the modified GNKQ (Cronbach's alpha= 0.96) and outstanding test-retest reliability (ICC = 0.98). More than 75% of items demonstrated acceptable item–total correlations. The mean nutrition knowledge score was 61.14 ± 17.02. There is a significant difference in nutrition knowledge scores between known groups (Nutrition and non-nutrition students; $t = 11.94$, $p < 0.001$), supporting construct validity.

*Table 1. Summary of Psychometric Properties of the Nigerian General Nutrition Knowledge Questionnaire (NG-GNKQ-R)*

| Property | Results |
|---|---|
| **Content Validity (S-CVI)** | 0.81 |
| **Overall Cronbach's alpha** | 0.96 |
| **Overall ICC** | 0.98 |
| **Construct Validity** | t= 11.94, p <0.001 |

## CONCLUSION AND RECOMMENDATION(S)

These findings suggest that the adapted GNKQ is a valid and reliable instrument for assessing nutrition knowledge among young adults in Nigeria and can be useful for nutrition focused research and policies, public health assessments and strengthening multi-sectoral collaboration between health, education, and food system stakeholders.; however, further validation in other Nigerian populations and settings is recommended.

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**Theme:** **DELIVERING BETTER NUTRITION FOR ALL: Connecting The Dots Across Life Cycle, Systems, & Sectors**

**Sub-theme:** **Adolescent Nutrition and Health: Characteristics, Risk Factors, and Opportunities of an Overlooked Life Stage**

**Title:** **Impact of Nutrition Education on Knowledge and Consumption of Fruit and Vegetable Among Primary School Children In Umuahia Metropolis, Abia State, Nigeria**

**Author (s):** Ukegbu, P.O.[1],*Okwunodulu, C.C.[1], Sopuru, J.C.[1], Okereke, I.[1], Chijioke, D.S.[1], Kanu, R.U.[2], Anyanwu, E.[2], Ukegbu, A.H.[3], and Ikpemo, K[1].

[1]Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria.

[2]Department of Agricultural Extension, Michael Okpara University of Agriculture, Umudike. Abia State, Nigeria

[3]Department of Nursing Sciences, Gregory University, Uturu, Nigeria

***Corresponding author, email and phone number:**
okwunoduluclaire@gmail.com, +2348105269118

**Keywords:** **Nutrition education, fruit consumption, vegetable consumption, nutrition knowledge.**

**Highlights:**

- Nutrition education improved fruit and vegetable nutrition knowledge
- Fruit intake increased significantly but no significant vegetable intake.

**BACKGROUND AND OBJECTIVES:**

Insufficient fruit and vegetable consumption among school-aged children remains a significant public health concern and contributes to poor dietary quality, micronutrient deficiencies, and increased risk of diet-related non-communicable diseases later in life[1].

**MATERIALS AND METHODS:**

A school-based quasi-experimental pre–post intervention study was conducted among 384 primary school children aged 6–10 years from two primary schools in Umuahia Metropolis, Abia State. Baseline and endline data were collected using an interviewer-administered questionnaire. Paired samples t-tests compared baseline and endline consumption and nutrition knowledge; $p < 0.05$ was considered significant.

**RESULTS AND DISCUSSION:**

Fruit consumption increased significantly from 31.92 ± 12.57 at baseline to 33.90 ± 11.69 after the intervention (mean difference = +1.97; $t(384) = -2.380$, $p = 0.018$), although the effect size was small (Cohen's $d = 0.12$). Vegetable consumption increased from 25.14 ± 11.79 to 26.64 ± 10.88, but the improvement was not statistically significant ($t(384) = -1.878$, $p = 0.061$). Fruit nutrition knowledge improved significantly from 89.24 ± 15.40 to 95.91 ± 10.51 (mean difference = 6.67; $t(384) = -7.126$, $p < 0.001$; Cohen's $d = 0.36$). Similarly, vegetable nutrition knowledge increased significantly from 90.29 ± 13.29 to 96.09 ± 9.44 (mean difference = 5.81; $t(384) = -7.527$, $p < 0.001$; Cohen's $d = 0.38$). These findings agree with previous reports[2] which reported that school-

based nutrition education improves nutrition knowledge and can produce positive, though often modest, improvements in fruit and vegetable intake among children.

**Table 1. Comparison of Fruit and Vegetable Consumption Before and After Nutrition Education (Paired Samples t-test)**

| Variable | Baseline Mean ± SD | Endline Mean ± SD | Mean Change | t- statistical test value | p-value | Cohen's d |
|---|---|---|---|---|---|---|
| Overall fruit consumption score | 31.92 ± 12.57 | 33.90 ± 11.69 | +1.97 | -2.380 | 0.018 | 0.12 |
| Overall vegetable consumption score | 25.14 ± 11.79 | 26.64 ± 10.88 | +1.50 | -1.878 | 0.061 | 0.10 |

**Table 2. Comparison of Fruit and Vegetable Nutrition Knowledge Before and After Nutrition Education (Paired Samples t-test)**

| Variable | Baseline Mean ± SD | Endline Mean ± SD | Mean Change | t- statistical test value | p-value | Cohen's d |
|---|---|---|---|---|---|---|
| Overall fruit nutrition knowledge score | 89.24 ± 15.40 | 95.91 ± 10.51 | +6.67 | -7.126 | 0.000 | 0.36 |
| Overall vegetable nutrition knowledge score | 90.29 ± 13.29 | 96.09 ± 9.44 | +5.81 | -7.527 | 0.000 | 0.38 |

## CONCLUSION AND RECOMMENDATIONS

School-based nutrition education effectively improved nutrition knowledge and significantly increased fruit consumption, but not vegetable intake. Integrating nutrition education with supportive school food environments, parental engagement, and improved access to fruits and vegetables is recommended.

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**Sub-Theme: Fostering Innovation, Policy Coherence and Multi-Sectoral Partnerships**

Title: The Convergence of Nigeria's Agriculture Policies against its Nutrition Agendas and International Best Practice

Adeniyi, V.O.[1], *Anoemuah, V.E.[1], Oladejo, E.O.[1] and Ariyo, O.[1]
viviananoemuah@gmail.com,+2348100943185
[1]Department of Human Nutrition and Dietetics, University of Ibadan.

**Keywords:** Policy Coherence, Agricultural Policy, Food and Nutrition Policy

**Highlights**

- Poor alignment exists between agriculture policies and nutrition agendas in Nigeria.
- Stakeholder awareness of key agriculture and nutrition policies was low.
- Over half of policies poorly aligned with FAO recommendations.

**Background and Objectives**

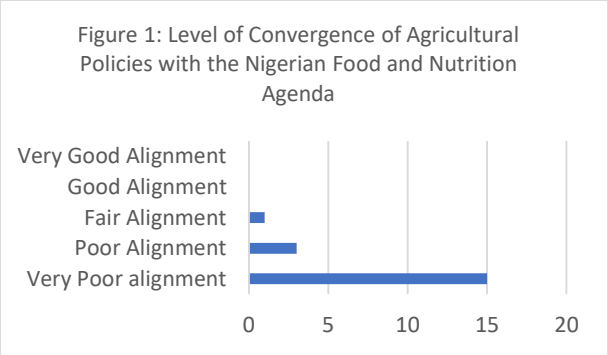
Malnutrition and food security remain a severe public health crisis in Nigeria, despite the formulation and implementation of several policies and programmes. [1] These policies and programmes are, however, developed and implemented in silos with research citing high policy fragmentation and poor alignment with international best practice. [2] [3] This study aimed to assess the convergence between Nigeria's national agricultural policies and its food and nutrition agenda and international recommendations.

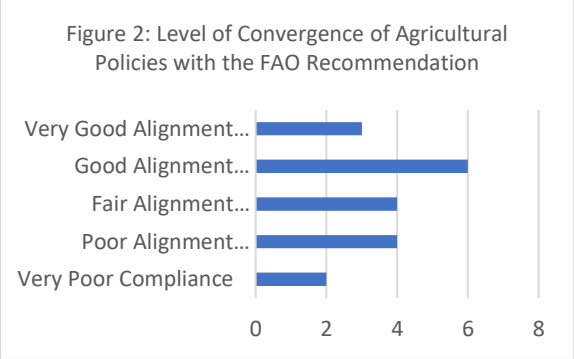
**Methodology**

The study utilised a descriptive cross-sectional mixed-methods design. About 36 policy and programme documents were reviewed against the objectives of the National Policy on Food and Nutrition 2016 and the FAO's 10 Key Recommendations for Improving Nutrition through agriculture and Food systems. This was followed by a structured survey of 21 purposively sampled stakeholders. The qualitative data from the policy review were converted into categorical frequencies and descriptively analysed to assess the degree of alignment.

**Results and Discussion**

About 78.95% of agricultural policies had very poor alignment with the Food and Nutrition Agenda [3]; this increased to 94.12% for non-agricultural policies, with only 1 non-agricultural policy having a fair alignment with the National Policy on Food and Nutrition. Stakeholders had very low awareness of both agricultural and food and nutrition policies, with only 19.7% admitting to being aware of agricultural policies and 28.3% being familiar with food and nutrition policies. 52% of the policies had only fair to very poor compliance with the FAO 10 key recommendations.




## Conclusion and Recommendations

This study confirms that poor convergence exists between Nigeria's agricultural policies and its nutrition agendas. This disconnect is compounded by widespread operational issues, as stakeholders responsible for executing policies exhibit low awareness of basic agricultural and nutrition policies. Ultimately, over half of the reviewed documents did not meet the FAO standards; as a result, Nigeria's multi-sectoral approach remains theoretical. To translate policies and programmes into public health outcomes, the government must mandate strict cross-sectoral assessments of policies and invest in capacity-building to bridge the awareness gap among stakeholders.

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**Theme/Sub-theme:** Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade)

**Title:** Food Insecurity and Health-Related Quality of Life (HRQoL) among Nigerian Postgraduate Students Abroad: Towards Multi-Sectoral Policy Coherence in Environment, Trade and Acculturation Programmes

*__Ibrahim-Audu, F__.[1] and Sulaiman, N.[2]

[1]Department of Biochemistry Faculty of Basic medical science Bayero University Kano

[2]Department of Nutrition and Dietetics, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

*Corresponding author, e-mail: faeezahibrahim@gmail.com, Phone: +2349069082075

**Keywords:** Food insecurity; HRQoL; International postgraduate students; Acculturative stress

**Highlights**

- Seven in ten Nigerian postgraduate students abroad were food insecure
- Food insecurity independently predicted poorer physical and mental HRQoL
- Findings support a multi-sectoral, home-host country food, trade and acculturation policy

## BACKGROUND AND OBJECTIVES

International postgraduate face compounded threats to wellbeing from acculturative stress and limited access to affordable, culturally-appropriate foods. Stress, psychological changes and poor health that arise from the inability to access sufficient amounts of food lead to food insecurity among students and therefore, low quality of life [1]. The objective of this study was to determine the factors associated with HRQoL among Nigerian postgraduate students in Univerisiti Putra Malaysia (UPM).

## MATERIALS AND METHOD

A cross-sectional study was conducted among 300 randomly selected Nigerian postgraduate students at UPM, using the SF-36v2 (Physical and Mental Component Summary scores) and the 10-item USDA Food Security Survey Module, alongside socio-demographic, psychosocial and anthropometric data. Data were analysed using Pearson correlation and stepwise multiple regression (SPSS v.22). Ethical approval was obtained from the UPM Medical Research Ethics Committee (JKEUPM).

## RESULTS AND DISCUSSION

**Table 1: Coefficients table of Linear Regression (Stepwise method) for PCS**

| | Unstandardized Coefficients | | Standardized Coefficients | *t* | *Sign* | ΔR2 |
|---|---|---|---|---|---|---|
| | **B** | **Std Error** | **Beta** | | | |
| (Constant) | -93.581 | 75.449 | | -1.240 | 0.000 | 0.151 |
| Food insecurity | -2.103 | 0.052 | -0.231 | -4.185 | 0.000 | |

**Coefficients table of Linear Regression (Stepwise method) for MCS**

| | Unstandardized Coefficients | | Standardized Coefficients | *t* | *Sig* | $\Delta R^2$ |
|---|---|---|---|---|---|---|
| | **B** | **Std. Error** | **Beta** | | | |
| (Constant) | -207.683 | 78.272 | | -2.653 | 0.000 | 0.111 |
| Food insecurity | -1.327 | 0.562 | -0.134 | -2.359 | 0.019 | |

Seven in ten students were food insecure, more among female than male students, despite 91.7% being on government scholarship, showing funding alone does not guarantee food security. Food insecurity correlated negatively with Physical Component Score ($r=-0.256$, $p<0.01$) and Mental Component Score ($r=-0.213$, $p<0.01$), and remained an independent predictor of both in stepwise regression (PCS: $\beta=-0.231$, $p<0.001$; MCS: $\beta=-0.134$, $p=0.019$), ($R^2=0.15–0.11$). Here, insecurity reflected access rather than income, as culturally-familiar Nigerian food was located far from student housing, mirroring access barriers among tertiary students elsewhere [2].

## CONCLUSION AND RECOMMENDATION(S)

Food insecurity was highly prevalent and independently predicted poorer physical and mental HRQoL, Universities should audit food access near campus and explore community gardens. Since culturally-familiar foods were often costly or imported, local sourcing partnerships could improve affordability while supporting sustainable food systems. Trade, environment and health policy coherence is needed across host-and home countries.

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**Sub-theme:** Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade)

**Title:** Effect of processing on the levels of macro mineral of selected commonly consumed legumes in Nigeria

**Name of Authors:** [*1, 2]Anifowose, F., [1]Shokunbi, O.S., and [1]Kayode, A.A.A.

**Affiliation of Authors:** [1] Department of Biochemistry, Babcock University, Ogun State
[2] Department of Medical Biochemistry, College of Medicine, Lagos State University, Ikeja, Lagos

[*]**Corresponding Author's Details:** florence.anifowose@lasucom.edu.ng, 08035660850

**Highlights:**

- Local processing methods reduced macro mineral contents of commonly consumed legumes.
- Processing methods influence the reduction of macro minerals in legumes

**BACKGROUND AND OBJECTIVE:** The Food and Agriculture Organization (FAO) declared 2016 the International Year of Pulses, focusing on food production and nutritional diversity to help eradicate hunger and malnutrition [1] Productions of the common legumes in Nigeria in 2021 are as follows: cowpea 4,701,992 (hectares), groundnut 4,271,859 (hectares), and soya beans 1,057,861(hectares) [2]. Yet Nigeria ranks one of the highest Global Hunger Index (GHI) score 115$^{th}$ out of 120 countries with a score of 32.8 [3] in 2025. Legumes contain micronutrients, but nutrition ignorance and apathy deprive the populace to the nutrient benefits. In addition, limited data exist on the extent to which common household processing impact the levels of minerals in legumes [4]. Hence, this research determined the effect of processing on the macro mineral levels of commonly consumed legumes in Nigeria.

**MATERIALS AND METHODS:** Cowpea, groundnut, soybean and fermented African locust beans were purchased from the markets across six geopolitical zones in Nigeria. Some batches were purposively selected and processed to various locally consumed forms. They were dried and wet digested using AOAC official method (2015.01) before macro mineral determination, using Inductively coupled plasma-optical emission spectrophotometer (ICP-OES).

**RESULTS AND DISCUSSION:** Table 1 shows the effect of processing on the contents of macro minerals in some commonly consumed legumes in Nigeria. The processing had significant ($p$ < 0.05) effect on the levels of Ca, K, Mg, and P in most of the processed cowpea, groundnut, and fermented African locust bean. Fresh and fried tofu also had significant reduction in the macro mineral contents.

**Table 1: Effect of processing on the levels of macro minerals (mg/100g dry weight) in commonly consumed legumes in Nigeria**

| Legume form/Processing | Ca | K | Mg | Na | P |
|---|---|---|---|---|---|
| Cowpea raw | 21.5±0.496$^{d}$ | 922±5.52$^{d}$ | 369±12.8$^{a}$ | 3.62±0.395$^{a}$ | 130±1.06$^{d}$ |
| Plain boiled Cowpea | 19.5±0.574$^{c}$ | 589±10.3$^{b}$ | 243±10.3$^{b}$ | 7.83±0.318$^{b}$ | 122±0.692$^{c}$ |
| Pottage beans | 15.5±0.402$^{a}$ | 471±8.18$^{a}$ | 190±8.02$^{a}$ | 9.99±0.773$^{c}$ | 81.7±2.31$^{a}$ |
| *Moi-moi* | 16.9±0.395$^{b}$ | 879±10.7$^{c}$ | 276±5.19$^{c}$ | 8.90±6.084$^{b}$ | 112±1.38$^{b}$ |
| Groundnut raw | 13.9±0.410$^{c}$ | 559±6.87$^{c}$ | 385±11.4$^{b}$ | 4.30± 17.8$^{b}$ | 119±0.411$^{a}$ |
| Boiled groundnut | 13.2±0.222$^{b}$ | 434±4.85$^{a}$ | 389±14.2$^{c}$ | 6.64±0.542$^{c}$ | 126±0.411$^{c}$ |
| Roasted groundnut | 7.9±0.0325$^{a}$ | 494±5.18$^{b}$ | 339±7.25$^{a}$ | 1.50±0.0481$^{a}$ | 125±1.51$^{b}$ |
| Peanut butter | 16.8±0.202$^{d}$ | 690±13.1$^{d}$ | 458±28.1$^{d}$ | 22.5±1.18$^{d}$ | 175±0.520$^{d}$ |
| Fermented African locust beans (LB) | 87.0±1.39$^{c}$ | 539±3.51$^{b}$ | 474±13.6$^{c}$ | 285±3.18$^{c}$ | 185±4.36$^{c}$ |
| Tomatoes sauce with LB | 65.8±1.25$^{b}$ | 539±10.3$^{b}$ | 273±10.9$^{b}$ | 81.0±1.83$^{b}$ | 82.6±1.44$^{b}$ |
| Vegetable soup with LB | 55.8±0.103$^{a}$ | 504±9.97$^{a}$ | 253±3.88$^{a}$ | 77.5±2.84$^{a}$ | 76.8±0.695$^{a}$ |
| Soybean raw | 65.3±1.36$^{d}$ | 922±35.6$^{d}$ | 463±14.0$^{d}$ | 0.854±0.071$^{a}$ | 172±3.97$^{c}$ |
| Soybean powder | 62.0±1.271$^{c}$ | 922±14.3$^{c}$ | 446±17.3$^{c}$ | 0.87±0.05$^{a}$ | 194±3.04$^{d}$ |
| Tofu (fresh) | 14.9±0.328$^{a}$ | 186±3.08$^{a}$ | 86.7±2.63$^{a}$ | ND | 92.5±1.17$^{a}$ |
| Tofu (fried) | 203±0.089$^{b}$ | 256±2.53$^{b}$ | 124±0.420$^{b}$ | ND | 131±2.53$^{b}$ |

Results are represented as mean ± standard deviation (n = 3). Values with different superscripts in the same column within each legume are significantly different at $p < 0.05$.

**CONCLUSION AND RECOMMENDATION:** The study revealed that the local processing methods variedly influenced the levels of macro mineral of the commonly consumed legumes in Nigeria. In the development of innovative products from the legumes, there is a need exercise caution during processing to minimize macro mineral losses.

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**Subtheme: Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships/Transforming Local Food Systems**

**Title: Optimizing Strategic Development Financing Initiatives for Integrated Early Childhood Development, Food Systems and Nutrition Outcomes in Nigeria.**

Victor Ajieroh[1], Folakemi Ishola[2], Gbenga Ogunmoyela[3] and Oluchi Ezekannagha[4]

- **Affiliations:** [1]Praisegate Services & Consult, Lagos, Nigeria; [2]Department of Human Nutrition and Dietetics, University of Ibadan, Nigeria; [3]Consumer Advocacy for Food Safety Initiatives, Lagos, Nigeria; [4] Office of the Chief Scientist, CGIAR System Organization. c/o Alliance of Bioversity and CIAT. Rome

*Victor Ajieroh, vajieroh@yahoo.com; +2348186215478

**Keywords**: Development Finance; Nutrition; Early Childhood Development; Food Systems Infrastructures

## HIGHLIGHTS

- Agri-food systems infrastructure financing can help close funding gaps and contribute to improving nutrition and early childhood development outcomes.
- Across its phases, Nigeria's SAPZ initiative increasingly integrates gender, nutrition, and early childhood development considerations into its design and implementation but leaves room for significant improvement.
- Using appropriate tools and frameworks can strengthen the social and public-health impact potential of development financing and spatial economic interventions.

## BACKGROUND AND OBJECTIVES

Innovative use of strategic development financing can create enabling conditions to reduce malnutrition, improve food systems and advance early childhood development (ECD) in Nigeria. Nigeria's flagship Special Agro-Industrial Processing Zone (SAPZ) led by the African Development Bank and co-financed by IFAD and the Islamic Development Bank [1, 2] illustrates the potential of development finance to generate expanded economic and social returns. Phase I (2021; US$538 million) covered seven states and the FCT, while Phase II Tranche 1 (December 2025; US$1.1 billion) covers ten states; Tranches 2 and 3 of SAPZ2 remain under design. Given Nigeria's annual financing gap of over US$25–40 billion across key sectors and the allocation of less than 3% of annual budgets to food systems and nutrition [3,4], the design of large-scale investments is critical to ensuring that economic mandates also deliver sustainable social benefits. This study assessed how nutrition, gender, and ECD are addressed across both phases; identified progress, gaps, and implementation shortfalls; and developed entry-point-specific recommendations for future tranches and similar investments.

## MATERIALS AND METHOD

A structured qualitative review and comparative content analysis of publicly available SAPZ project documents compared the design and implementation of Phases I and II. Using the Nurturing Care, HLPE Food Systems, and UNICEF nutrition frameworks, project objectives, value chains, institutional arrangements, safeguards, and indicators were assessed for their attention to nutrition, food safety, gender, and early childhood development. Project-cycle

decision nodes were coded against the three frameworks. Findings distinguished direct provisions, indirect pathways, enabling conditions, and evidence gaps. Cross-phase comparisons highlighted areas for continuity, improvements, and omissions, informing practical recommendations for future design and implementation.

## RESULTS AND DISCUSSION

SAPZ2 Tranche 1 reflected more multisectoral collaboration for shared impact relative to SAPZ1 at various levels across the applied frameworks. Phase II's core design embeds an explicitly gender-responsive objective, hub crèches for childcare and nutrition, biofortified and nutrient-dense seed systems via CGIAR/TAAT partnerships; value chains expanded to legumes, horticulture, aquaculture and dairy; and a Food Safety and Quality Infrastructure Framework across all hubs [5]. The SAPZ trajectory shows progressive integration is feasible and can be deepened even though integration advanced at upstream design nodes but weakened downstream. The findings support a developmental additionality argument inferring that modest design adaptations on the same capital investment can generate substantially greater social returns.

## CONCLUSIONS AND RECOMMENDATIONS

Agro-food systems infrastructure investments can deepen existing inequalities unless they deliberately integrate gender-responsive infrastructure, environmental and social safeguards, dietary diversity, and quality childcare and early childhood development. Although the SAPZ phases have a strong strategic focus and significant potential, realizing broader nutrition and ECD benefits requires applying appropriate frameworks, influencing future project design, and maintaining sustained dialogue with project implementation units. Future tranches should prioritize nutrient-dense and diverse commodities, establish quality childcare and ECD services, protect dedicated nutrition and ECD funding, extend social requirements to private developers, appoint nutrition focal points in state implementation units, and track dietary diversity and child outcomes.

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|---|---|
| **Subtheme:** | Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade) |
| **Title:** | Prevalence of cardiovascular disease risk factors among adults (20-60 years) in Nibo, Awka South LGA, Anambra State, Nigeria |
| **Name of Authors:** | **Ayogu, R. N. B.,[1] *Imoh, C. A.[1] and Ogbuefi, C. G.[1]** |
| **Affiliation of Authors:** | [1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka<br>*Corresponding author, e-mail: chisom.imoh.pg89602@unn.edu.ng; Tel: +2348165244523 |
| **Keywords:** | Cardiovascular disease, Dyslipidaemia, Obesity, Hypertension |

**Highlights:**

- Alcohol intake, low physical activity and dyslipidaemia were highly prevalent among the adults.
- Over half of the respondents had a high waist-to-hip ratio.
- Overweight/obesity, hypertension and dyslipidaemia were significantly associated with clustering of CVD risk factors.


**BACKGROUND AND OBJECTIVES**

An estimated 19.8 million people died from CVDs in 2022, representing approximately 32% of all global deaths [1]. Increasing prevalence of modifiable risk factors may contribute significantly to the growing burden of CVDs, particularly in low-and middle-income countries like Nigeria. This study assessed the prevalence and clustering of CVD risk factors among adults (20–60 years) in Nibo, Awka South LGA, Anambra State, Nigeria.

**MATERIALS AND METHODS**

A cross-sectional study was conducted among 353 adults selected from households in Awka South LGA using five-stage sampling technique. Ethical approval and consent forms were obtained. Data were collected using a structured and modified global physical activity questionnaire, anthropometric, clinical and biochemical methods. Statistical analysis involved descriptive and Chi-square tests with significance set at $p<0.05$.

**RESULTS AND DISCUSSION**

Alcohol intake (45.3%), snack consumption (85.0%), low physical activity (43.6%), overweight/obesity (55.5%),high waist hip ratio (62.3%) and dyslipidaemia were prevalent among the respondents in line with the report from other studies among Nigerian adults [2]. Nearly one-third (29.2%) had a combination of elevated blood pressure and hypertension stage 1 supporting earlier finding [3], that reported a prevalence of 28.9% among Nigerian adults. These findings suggest a worrisome prevalence of CVD of 68.3%.

**Table 1: Prevalence of CVD risk factors among the respondents (N = 353; Subsample for biochemical measures, n = 39)**

| Classification | Risk factor | N (%) |
|---|---|---|
| Alcohol consumption | No | 193 (54.7) |
| | Yes | 160 (45.3) |
| *Snack consumption | No | 53 (15.0) |
| | Yes | 300 (85.0) |
| Physical activity | Moderate/vigorous | 199 (56.4) |
| | Low | 154 (43.6) |
| Overweight/obesity | Absent | 157 (44.5) |
| | Present | 196 (55.5) |
| Waist-hip ratio | Low risk | 133 (37.7) |
| | **High risk | 220(62.3) |
| Blood pressure (mm/Hg) | Normal (<120/80) | 250 (70.8) |
| | Elevated (120-129/<80) | 73 (20.7) |
| | Hypertension stage 1 (130-139/80-89) | 30 (8.5) |
| Blood glucose (mg/dl) | Normal (<100) | 24 (61.5) |
| | Prediabetes (100-125) | 15 (38.5) |
| Dyslipidaemia | Absent | 6 (15.4) |
| | ***Present | 33 (84.6) |
| Clustering of CVD risk factors | Zero risk factor | 112(31.7) |
| | One risk factor | 205(58.1) |
| | Two risk factors | 32(9.1) |
| | Three risk factors | 4(1.1) |

*Fried and baked snacks+sugar sweetened beverages **Males=>0.90, female>0.85
***Having at least one abnormal component of the lipid profile

**Table 2: Factors associated with clustering of CVD risk factors**

| | Clusters of CVD Risk factors | | | | |
|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | |
| **Variables** | **N(%)** | **N(%)** | **N(%)** | **N(%)** | **Chi square(P) value** |
| **Age (years)** | | | | | |
| 20-39 | 87(77.7) | 144(70.2) | 23(71.9) | 3(75.0) | 7.888(0.545) |
| 40-60 | 25(22.3) | 61(29.8) | 9(28.1) | 1(25.0) | |
| **Gender** | | | | | |
| Female | 17(15.2) | 122(59.5) | 17(53.1) | 1(25.0) | 59.281(0.000)* |
| Male | 95(84.8) | 83(40.5) | 15(46.9) | 3(75.0) | |
| **Physical activity level** | | | | | |
| Low | 53(47.3) | 85(41.5) | 15(46.9) | 1(25.0) | 1.713(0.634) |
| Moderate/vigorous | 59(52.7) | 120(58.5) | 17(53.1) | 3(75.0) | |
| **Body mass index** | | | | | |
| Underweight | 6(5.4) | 7(3.4) | 0(0.0) | 0(0.0%) | |
| Normal | 50(44.6) | 93(45.4) | 1(3.1) | 0(0.0%) | |
| Overweight | 56(50.0) | 94(45.9) | 8(25.0) | 0(0.0%) | 270.066(0.000)* |
| Obesity | 0(0.0) | 11(29.0) | 23(60.5) | 4(10.5) | |
| **Waist hip ratio** | | | | | |
| Low risk | 111(99.1) | 18(8.8) | 4(12.5) | 0(0.0) | |
| High risk | 1(0.9) | 187(91.2) | 28(87.5) | 4(100.0) | 263.948(0.000)* |
| **Hypertension** | | | | | |
| Normal | 90(80.4) | 151(73.7) | 9(28.1) | 0(0. | 130.649(0.000)* |
| Elevated | 22(19.6) | 44(21.5) | 7(21.9) | 0(0.0) | |
| Hypertension stage 1 | 0(0.0) | 10(4.9) | 16(50.0) | 4(100.0) | |
| **Diabetes** | | | | | |
| Normal | 2(66.7) | 10(62.5) | 11(61.1) | 1(50.0) | 0.153(0.985) |
| Prediabetes | 1(33.3) | 6(37.5) | 7(38.9) | 1(50.0) | |
| **Dyslipidaemia** | | | | | |
| Absent | 3(100.0) | 3(18.8) | 0(0.0) | 0(0.0) | 20.276(0.000)* |
| Present | 0(0.0) | 13(81.3) | 18(100.0) | 2(100.0) | |

*P<0.001

The findings presented in Table 2 showed that clustering of CVD risk factors was significantly associated with being a male and having obesity, high waist-hip ratio (WHR), hypertension and dyslipidaemia ($p<0.001$). These results are consistent with existing evidence showing that adjustment in lifestyle and dietary behaviours can prevent CVDs [1].

**CONCLUSION AND RECOMMENDATIONS:** A high prevalence of CVD risk factors was observed among adults in the study area. Body mass index, WHR, hypertension and dyslipidaemia were significantly associated with clustering of CVD risk factors. Community-based health promotion and nutrition education programmes are recommended to reduce the burden of CVD among adults.

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# SUB-THEME 7: POSTER

**Theme/Sub theme:** Innovations in Clinical Nutrition Practice Across the Life Cycle: Aligning Evidence-Based Protocols with Health System Delivery.

**Title:** Nutrient Intake and Hygiene Practices among Elderly People in Federal University of Agriculture Abeokuta Farm Families.

**Name of Author (s):** ***Oyedapo O.E.[1],** Olayiwola I.O.[2], Adebayo Y.O.[2]

**Affiliation of Author (s):** Department of Nutrition and Dietetics, Federal University of Agriculture Abeokuta, Ogun state, Nigeria. P.M.B

**Corresponding Author:** *oyedapooluwaseyiesther@gmail.com, +2348139566678.

**Keywords:** Nutrient intake, Hygiene practices, Elderly, Farm families.

**BACKGROUND AND OBJECTIVES:**

The elderly population is a vulnerable group that requires special attention in terms of their nutrient intake and hygiene practices to maintain their health and well-being and this population are increasing worldwide day by day and the number of older people is growing faster than any age group population [1]. The United Nations defines an elderly person as an individual who is over 60 years of age [2]. This study aims to assess the nutrient intake and hygiene practices among elderly people in Federal University of Agriculture Abeokuta farm families.

**METHODOLOGY:**

A cross-sectional study of 165 elderly was conducted in seven of the ten communities in Federal University of Agriculture Abeokuta. Respondents were selected using a simple random sampling. Nutrient intake was assessed using 24-hour dietary recall. Hygiene practices was assessed using a modified World Health Organization (W.H.O) and United Nation Children's Fund (UNICEF) water, sanitation and hygiene (WASH) questionnaire. Data were coded and analyzed using SPSS version 25.0. The results were presented using standard deviation, frequency counts, percentages, means and Pearson's correlation was used to assess relationship among variables.

**RESULTS AND DISCUSSION:**

A majority of the respondents (48.5%) reported eating twice a day, followed by those who ate thrice a day (41.2%). Only a small percentage ate once a day (7.3%) or more than thrice a day (3.0%). Regarding skipping meals, more than half of the respondents (56.4%) reported skipping

meals, while 43.6% did not. Among those who skipped meals, 34.5% skipped lunch, 23.0% skipped breakfast, and 7.3% skipped dinner. In terms of personal hygiene, majority (90.3%) reported bathing every day and (89.7%) reported having access to clean water for bathing and washing. A significant proportion (49.7%) did not have a fixed or mobile place for hand washing and most respondents are not responsible for sanitation like cleaning of environment. A statistically significant correlations ($p<0.05$) were observed between hygiene practices and nutrient intake indicating that poor hygiene may exacerbate nutritional deficiencies.

**Table 1: Nutrient intake of respondent**

| Nutrient | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | Median | RDA | RDA% | Median | RDA | RDA% |
| **Energy(kcal)** | 720.43 | 2600 | 27.71 | 778.55 | 2000 | 38.93 |
| **Protein (g)** | 26.54 | 56 | 47.39 | 26.96 | 56 | 48.14 |
| **Fat (g)** | 4.68 | 58 | 8.07 | 6.27 | 44 | 14.25 |
| **Carbohydrate (g)** | 124.54 | 130 | 95.80 | 127.82 | 130 | 98.32 |
| **Dietary fiber (g)** | 10.50 | 30 | 35.00 | 10.50 | 21 | 50.00 |
| **Vit. A (µg)** | 334.52 | 900 | 37.17 | 274.19 | 700 | 39.17 |
| **Vit. B1 (mg)** | 0.47 | 0.9 | 52.22 | 0.45 | 0.7 | 64.29 |
| **Vit. B2 (mg)** | 0.39 | 1.3 | 30.00 | 0.39 | 1.1 | 35.45 |
| **Vit. B6 (mg)** | 0.66 | 1.7 | 38.82 | 0.65 | 1.5 | 43.33 |
| **Vit. C (mg)** | 27.61 | 90 | 30.68 | 12.12 | 75 | 16.16 |
| **Sodium(mg)** | 449.17 | 2300 | 19.53 | 619.37 | 2300 | 26.93 |
| **Potassium(mg)** | 981.28 | 3400 | 28.86 | 814.82 | 3400 | 23.97 |
| **Calcium(mg)** | 151.16 | 1200 | 12.60 | 135.62 | 1200 | 11.30 |
| **Magnesium(mg)** | 110.88 | 420 | 26.40 | 103.03 | 320 | 32.20 |
| **Phosphorus(mg)** | 431.94 | 700 | 61.71 | 411.98 | 700 | 58.85 |
| **Iron(mg)** | 6.59 | 8 | 82.38 | 6.32 | 8 | 79.00 |
| **Zinc(mg)** | 3.97 | 11 | 36.09 | 4.60 | 8 | 57.50 |

## CONCLUSION AND RECOMMENDATION:

The elderly had below the recommended intake for fat, vitamins and minerals with gaps in WASH infrastructures. Education on bioavailability of nutrient, hygiene practices and sanitation awareness is crucial with adequate facilities and resources should be put in place.

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**Sub-theme:** Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships.

**Title:** Triple Burden of Malnutrition in Africa: A Narrative Review of Trends, Determinants and Policy Challenges

**Name of Author (s):** Akinade E. Ogunniyi[1]*, Badmus S. Latifa[1,2], Oluwadamilola E. Adetoro[1], Genevieve Awuah-Cobbinah[3], Folashade R. Sikiru[4], Fatimah O. Gbadamosi[5] and Eunice A. Olorunfemi[6]

**Affiliation of Author (s):** [1] Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

[2] Nutrition Department, Ministry of Health, Ebonyi State, Nigeria

[3] Department of Clinical Nutrition and Dietetics, School of Allied Health Sciences, College of Health and Allied Sciences, University of Cape Coast, Ghana

[4] Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture Abeokuta, Ogun State, Nigeria

[5] Department of Nutrition and Food Sciences, Faculty of Agricultural and Food Sciences, American University of Beirut, Lebanon

[6] Department of Human Kinetics and Health Education, Faculty of Education, University of Lagos, Lagos, Nigeria

**Correspondence:** Akinade E. Ogunniy; enochakinade4@gmail.com

**Keywords:** Triple burden of malnutrition, micronutrient deficiency, Africa, food systems.

**Highlights**

- The triple burden of malnutrition is rising across Africa, with undernutrition, overweight/obesity and hidden hunger increasingly overlapping across populations and households.
- Socioeconomic inequality, urbanisation, gender disparity, weak food-system governance and poor diet quality are key structural drivers.
- Integrated double- and triple-duty actions are needed to link maternal-child nutrition, WASH, healthy food environments, surveillance and social protection.

**Background and Objectives:**

Africa is experiencing a complex nutrition transition in which undernutrition, overweight/obesity and micronutrient deficiencies coexist within individuals, households and geographic populations [1,2,3]. This triple burden of malnutrition (TBM) threatens child growth, cognitive development, productivity and non-communicable disease prevention [4]. This review aimed to synthesize evidence on TBM trends, determinants and policy challenges across Africa, while clarifying the different levels at which TBM is operationalised and interpreted.

**Materials and Method:**

A narrative review and thematic synthesis were conducted using peer-reviewed studies, Demographic and Health Survey-based analyses, regional reports and policy evidence published between January 2005 and March 2025. Search terms included “triple burden of malnutrition”, “double burden”, “undernutrition”, “stunting”, “wasting”, “overweight”, “obesity”, “micronutrient deficiency”, “anaemia”, “hidden hunger”,

"nutrition transition" and "Africa". Eligible sources addressed at least one TBM component in an African context and were synthesised across three analytical levels: individual-level TBM, household-level TBM and geographic/population-level TBM [1,2,5].

**Results and Discussion:**

Evidence showed persistent child undernutrition alongside rising adult overweight and obesity, particularly in urban and peri-urban settings. At the individual level, early-life growth faltering may coexist with later adiposity and micronutrient inadequacy due to poor diet quality, infection burden and lifestyle transition. At the household level, mother-child pair analyses demonstrated the coexistence of maternal overweight/obesity with child stunting, underweight and/or anaemia, reflecting intergenerational and intra-household inequalities [1,2]. At the geographic/population level, spatial evidence, including findings from Ethiopia, showed overlapping hotspots of stunting, overweight and micronutrient deficiencies influenced by geo-socio-ecological conditions, food environments and market integration [5]. DHS trend indicators also showed that while stunting has declined in some countries, child anaemia and maternal overweight/obesity remain high in several settings [4]. Common drivers included poverty, wealth inequality, low dietary diversity, gender inequity, urbanisation, weak food-system regulation, poor WASH conditions and limited access to quality maternal-child nutrition services.

**Conclusion and Recommendation:**

The triple burden of malnutrition in Africa should not be treated as a single uniform condition, but as related individual, household and geographic phenomena with distinct determinants and programme implications. Effective response requires integrated, multisectoral and level-specific strategies. Individual-level TBM requires life-course prevention that protects early growth and micronutrient status while reducing later obesity and NCD risk. Household-level TBM requires strengthened maternal-child nutrition services, anaemia prevention, dietary diversity support, WASH improvement and household food-security interventions. Geographic TBM requires hotspot-focused planning supported by surveillance and spatial evidence. Stronger food-system governance, regulation of unhealthy food environments, fortification, social protection and women's empowerment are recommended to accelerate progress towards SDG 2, SDG 3 and Agenda 2063 [4].

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**Sub-theme: Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade)**

# Connecting Household, Health, and WASH Sectors: Determinants of Malnutrition among Under-5 Children in Pakata, Kwara State

***Kareem B.R.[1], Alabi O.D.[1], Adeyemo G.A.[1], Adeleke I.V.[1], and Yunus H.M.[1]**

[1]Department of Nutrition and Dietetics, Ladoke Akintola University of Technology Ogbomoso, Nigeria.

brkareem@lautech.edu.ng, +2348086704485

**Keywords:** Food Insecurity, Household Determinants, Life Cycle Nutrition and Malnutrition

**Highlight:**

- Maternal Education is the key to high malnutrition burden in Pakata.
- WASH deficit drives risk, Food insecurity is a major driver.
- No single sector can address malnutrition alone, multi-sectoral action required.

## BACKGROUND AND OBJECTIVES

Childhood malnutrition is a persistent and devastating public health challenge in Nigeria, with long-term consequences for physical and cognitive development, economic productivity, and national development [1]. Malnutrition roots extend across multiple sectors. National surveys have highlighted these issues and identified importance of localized data for designing effective, context-specific interventions [1, 2]. Pakata, a peri-urban community in Kwara State, lacks such data. This study addresses that gap by examining the prevalence and multi-sectoral determinants of malnutrition among under-5 children in Pakata.

## MATERIALS AND METHODS

Cross-sectional study of 200 caregiver-child pairs was conducted in Pakata, Kwara State. Anthropometric measurements obtained. The measurements were converted to Z-scores using the WHO 2006 Child Growth Standards [3]. Stunting was defined as height-for-age Z-score (HAZ) < −2, wasting as weight-for-height Z-score (WHZ) < −2, underweight as weight-for-age Z-score (WAZ) < −2, and acute malnutrition as MUAC < 12.5 cm.

A structured questionnaire was used to collect data on sociodemographic, socioeconomic, and WASH indicators. Binary logistic regression analysed determinants, adjusting for child sex and age using SPSS version 25.0 at $p < 0.05$.

## RESULTS AND DISCUSSION

The study found a high burden of malnutrition across all indicators. Stunting prevalence was 30.5%, wasting 14.0%, underweight 22.5%, and acute malnutrition (MUAC < 12.5 cm) 19.0%. All indicators exceeded the WHO critical thresholds, signalling a public health emergency at the community level. Logistic regression identified significant determinants spanning all three sectors (Table 1).

***Table 1: Adjusted Odds Ratios for Multi-Sectoral Determinants of Malnutrition***

| Determinant | AOR | 95% CI | p-value |
|---|---|---|---|
| Maternal Education: No Formal Education (vs. Secondary) | 5.82 | 1.52–22.3 | 0.010* |
| Household Income <₦25,000 (vs. ≥₦25,000) | 2.34 | 1.08–5.07 | 0.031* |
| Frequent Food Shortage >4×/month (vs. Never) | 32.1 | 1.62–635 | 0.023* |
| Sanitation: Open Defecation (vs. Flush Toilet) | 11.82 | — | 0.001* |

**Statistically significant at p < 0.05. AOR = Adjusted Odds Ratio; CI = Confidence Interval.*

## CONCLUSION AND RECOMMENDATIONS

Malnutrition in Pakata reflects gaps across household, health, and WASH sectors. Delivering better nutrition for this life cycle stage requires multisectoral collaboration between PHC, water/sanitation agencies, and community leaders to improve caregiver education, income, sanitation, and food security.

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**SUB-THEME 7**: Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships.

**TITLE**: Implementation and Capacity need for the use of Education for Effective Nutrition in Action (ENACT) course developed by the Food and Agriculture Organisation (FAO) in Tertiary Institutions in Nigeria.

**Name of Author(s)**:*Nkwoala, C. C.[1], Kanu, G. N.[2], Ezeibe, C. P.[3], Nwofia, B. K[4]. and Asumugha, V. U [5].

**Affiliation of Author(s)**: [1,3,4, 5] Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture, Umudike, Abia State.

[2] Department of Human Nutrition and Dietetics, Ambrose Alli University Ekpoma, Edo State.

**Email and phone number of corresponding author**: nkwoala.chiaka@mouau.edu.ng, +234 806 015 1557

**Keywords**: Nutrition education, FAO ENACT, Tertiary institutions, Nigeria.

**Highlights**

- Although CCMAS mandates the FAO ENACT course for teaching NEC, 70% of Institutions offering Nutrition and Dietetics programmes in Nigeria have not started its implementation.
- Between 2020 and 2026, only 64% (3,561 of 5,605) of students received standardized FAO ENACT based NEC training.
- Over half (56%) of institutions have no Lecturer trained in the use of the FAO ENACT course and 93% reported a strong need for capacity building.

## BACKGROUND AND OBJECTIVES

Nutrition education and communication (NEC) is essential in tackling all forms of malnutrition (1). To build a strong workforce and address the gap in relevant professional training in nutrition education, the Food and Agriculture Organization (FAO) developed the "Education for Effective Nutrition in Action (ENACT)" course in 2015. However, in 2023 the National Universities Commission (NUC) adopted the FAO ENACT course in the Core Curriculum and Minimum Academic Standards (CCMAS) for Human Nutrition and Dietetics programmes to be used in teaching Nutrition Education and Communication (2). This rapid appraisal survey aimed to elicit information on the level of implementation of the CCMAS and the capacity needs for the use of the FAO ENACT course in teaching NEC in tertiary institutions in Nigeria.

## MATERIALS AND METHOD

A total of 44 public and private tertiary institutions were listed, and a link to a Google Form-based, self-administered online questionnaire was sent to the Heads of Department of Human Nutrition and Dietetics in the respective institutions. Data obtained from the submissions were cleaned, analyzed descriptively, and presented as charts.

## RESULTS AND DISCUSSION

The findings revealed that the adoption of the FAO ENACT course in teaching NEC across institutions from the 2020/2021 to 2025/2026 academic sessions remains low. Majority (70.4%) of the institutions have not incorporated the FAO ENACT course into their NEC teaching during the study period. This indicates low utilization of the ENACT course, which may be due to inadequate training and limited awareness among lecturers and emphasizes the need for institutional support and lecturer capacity for effective implementation (3).

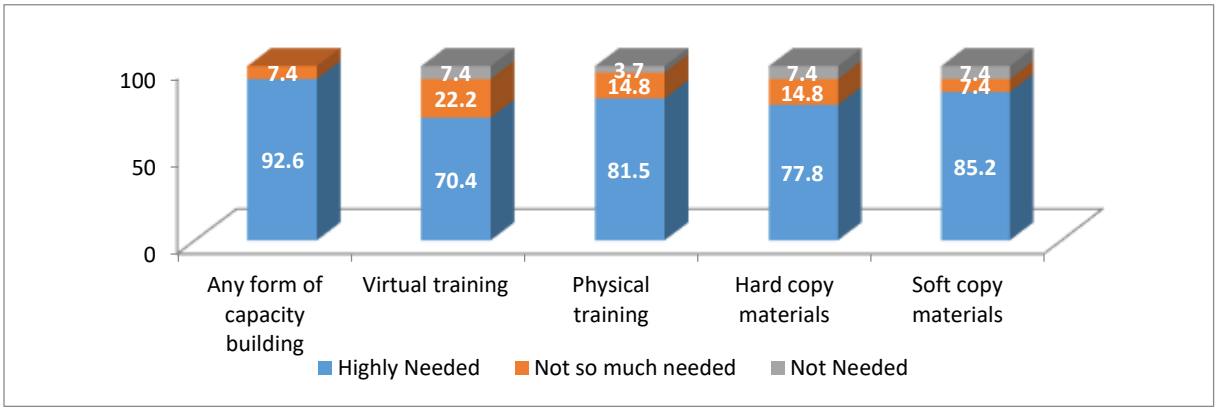



Figure 1: Capacity need on the use of FAO ENACT Course

Figure 1 shows that almost all (93%) of the institutions expressed a need for any form of capacity building on the use of the FAO ENACT course, particularly through physical training and access to teaching materials. This suggests a strong demand for training to improve nutrition education delivery, which is essential for effective nutrition education programmes (4,5).

## CONCLUSION AND RECOMMENDATION

The adoption of the FAO ENACT course within the CCMAS has created an urgent need to initiate national and regional Training of Trainers (ToT) programmes to build a critical mass of certified FAO ENACT tutors within Nigerian tertiary institutions. Further capacity building is needed to

adapt FAO ENACT materials to diverse cultural contexts to ensure relevance and effectiveness at the community level. Development of a national training guideline is also recommended to enhance sustainability and uniformity.

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| | |
|---|---|
| **Subtheme:** | Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Education, Health, Environment) |
| **Title:** | Body Mass Index and Blood Pressure Status of Undergraduates (20-30 Years) in the University of Nigeria Nsukka |
| **Name of Authors:** | **Ayogu, R. N. B.,[1] *Okafor, I.G.[2] and Ugwu, I.C.[1]** |
| **Affiliation of Authors:** | [1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka<br>[2]Department of Human Nutrition and Dietetics, Nnamdi Azikiwe University, Nnewi Campus<br>*Corresponding author, e-mail:ifg.okafor@unizik.edu.ng, +2348104437785 |
| **Keywords:** | Body mass index, undergraduate, blood pressure. |

**Highlights**

- Underweight, overweight and obesity were prevalent among the undergraduates.
- One third of the respondents had central obesity.
- Body mass index and waist circumference were significantly associated with blood pressure of the respondents.

## BACKGROUND AND OBJECTIVES

University students, especially in Nigeria, face unique nutritional challenges. The shift from home to university life often results in altered eating habits, increased consumption of convenience foods, and irregular meal patterns (1). This population is at risk of developing both undernutrition and overnutrition, leading to a spectrum of health issues including hypertension and obesity. Therefore this study assessed the body mass index and blood pressure status as well as the relationship between the two among undergraduates aged 20-30 years in the University of Nigeria Nsukka, Enugu State.

## MATERIALS AND METHODS

A cross-sectional study involving 310 undergraduates selected through a 4-stage simple random sampling from three faculties was conducted at the University of Nigeria, Nsukka. Structured questionnaire, measurement of height, weight, waist circumference and blood pressure were data

collection methods. Statistical analysis involved descriptives (frequencies and percentages) and chi square test of SPSS, version 23 with statistical significance set at $p<0.05$.

## RESULTS AND DISCUSSION

Underweight (8.7%), overweight (24.5%), obesity (8.7%), central obesity (32.3%), stage 1 hypertension (14.2%) were prevalent among the respondents. Blood pressure status was significantly ($p<0.001$) associated with body mass index and waist circumference of the respondents.

**Table 1: Body mass index, waist circumference and blood pressure status of the respondents**

| Variables | Frequency | Percentage |
|---|---|---|
| **Body mass index*** | | |
| Underweight (<18.5 kg/m$^2$) | 27 | 8.7 |
| Normal (18.5–24.9 kg/m$^2$) | 180 | 58.1 |
| Overweight (25.0-29.9 kg/m$^2$) | 76 | 24.5 |
| Obesity (≥30 kg/m$^2$) | 27 | 8.7 |
| **Waist circumference**** | | |
| Normal waist circumference | 210 | 67.7 |
| ***Central obesity | 100 | 32.3 |
| **Blood pressure[a]** | | |
| Normal (<120/80 mmHg) | 255 | 82.3 |
| Prehypertension (120-139 /80-89 mmHg) | 6 | 1.9 |
| Stage 1 hypertension (140–159 mmHg / 90–99 mmHg) | 44 | 14.2 |
| Stage 2 hypertension (≥160 mmHg or DBP≥100 mmHg) | 5 | 1.6 |

*Body mass index (2), waist circumference (3), ***≥94cm for men; ≥80cm for women [a]Joint National Committee (JNC 7)

**Table 2. Relationship of body mass index and waist circumference with blood pressure of the respondents**

| Variables | Blood pressure classifications | | | |
|---|---|---|---|---|
| **Body mass index** | **Normal F (%)** | **Prehypertension F (%)** | **Hypertension F (%)** | **Total F (%)** |
| Underweight | 22(7.1) | 2(0.7) | 3(1.0) | 27(8.7) |
| Normal weight | 163(52.6) | 2(0.6) | 15(4.8) | 180(58.1) |
| Overweight | 56(18.1) | 1(0.3) | 19(6.2) | 76(24.5) |
| Obesity | 14(4.5) | 1(0.3) | 12(3.8) | 27(8.7) |
| **Total** | **255(82.3)** | **6(1.9)** | **44(15.8)** | **310(100.0)** |
| **$\chi$2(P)value** | | **43.314 (0.000)** | | |
| **Waist circumference** | | | | |
| Normal | 182(58.7) | 4(1.3) | 24(7.7) | 210(67.7) |
| High | 73(23.6) | 2(0.6) | 10(8.1) | 100(32.3) |
| **Total** | **255(82.3)** | **6(1.9)** | **44(15.8)** | **310(100.0)** |
| **$\chi$2(P)** | | **30.214(0.000)** | | |

The findings from this study showed that more than half (52.6%) of the respondents who had a normal BMI were in the pre-hypertensive category, while only a few (0.3%) had hypertension stage 2. Over half of the respondents (58.7%) with prehypertension had normal waist circumference, while only a few (8.8%) had central obesity. This is similar with the findings of Igho (4), who found that there was a significant correlation between BMI, waist circumference and blood pressure with a $p < 0.05$.

## CONCLUSION AND RECOMMENDATIONS

Based on the findings, the prevalence of overweight, obesity, central obesity and hypertension are issues of concern among undergraduates at University of Nigeria Nsukka. Nutrition education and lifestyle modification are recommended to prevent progression.

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**Sub-theme:** Fostering Innovations, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade)

**Title:** Nutritional and Phytochemical Composition of Doum Palm (*Hyphaene thebaica*) Fruit Functional Beverages

**Names of Authors:** Rahman, B. E. and *Shokunbi, O. S.

**Affiliation of Authors:** Department of Biochemistry, Babcock University, Ogun State.

***Corresponding Author's Details:** osshokunbi@gmail.com, +2348030689633

**Keywords:** Doum palm fruit beverage, *Hyphaene thebaica*, Nutritional composition, Phytochemical composition

**Highlights:** - Doum palm fruit-based beverages are nutritious and rich in phytochemicals.

- Yoghurt fortification with doum palm increases nutritional and phytochemical contents.

**Background and Objectives**:

Indigenous fruits, valued to improve agricultural trade and health, are being explored for their nutrient value. Doum palm (*Hyphaene thebaica*) fruit is not an exception, with its widely reported nutrient composition and abundance in phytochemicals [1]. The incorporation of doum palm fruit into functional beverages has not been fully explored and there are limited data on the nutritional and phytochemical composition of the existing beverage products of doum palm fruit. Thus, this study developed and evaluated the nutritional and phytochemical composition of varieties of the doum palm fruit functional beverages.

**Materials and Method:**

The yoghurts were produced with powdered skimmed milk, starter culture, water and doum palm fruit powder at two fortification levels [2]. The doum drinks were produced by soaking doum palm fruit for eight hours, and obtaining the filtrate [3], while the levels of concentrates were achieved by freeze-drying the drinks at varied timing. Proximate analyses were carried out following the standard AOAC methods. Total phenolic and total flavonoid contents were estimated using spectrophotometric methods. Data were analyzed using one-way analysis of variance, and means were compared using Tukey post hoc's test at $p < 0.05$.

**Results and Discussion:**

The doum concentrates were significantly lower in moisture and high in ash and carbohydrate contents, but the doum concentrate of higher strength was significantly higher in fiber content than other beverages. The fat and protein contents of the yoghurts are not significantly different, and they reduced proportionally as moisture increases in the doum drinks and concentrate. However, fiber increased with fortification in the yoghurts. The TPC of the plain yoghurt (33.2 mg GAE/g) was significantly lower than those of the fortified yoghurts. Doum concentrate of lower strength

exhibited the highest phenolic content (149.9 mg GAE/g). Doum yoghurt (fortified at 3%) and the doum drinks had significantly higher TFC compared with other beverages. Thus, the doum palm fortification enhanced the qualities of the beverages produced.

**Table 1:** Nutritional (g/100 g wet weight) and phytochemical composition of some Doum palm fruit-based functional beverages

| Sample<br>Parameter | PYOG | YOG1 | YOG2 | DCON1 | DCON2 | DDRK1 | DDRK2 |
|---|---|---|---|---|---|---|---|
| Moisture | $89.17 \pm 0.23^{d}$ | $88.84 \pm 0.19^{d}$ | $86.77 \pm 0.26^{c}$ | $39.61 \pm 1.64^{a}$ | $65.03 \pm 0.67^{b}$ | $87.45 \pm 0.02^{c,d}$ | $93.43 \pm 0.19^{e}$ |
| Ash | $0.97 \pm 0.01^{a}$ | $0.98 \pm 0.00^{a}$ | $0.98 \pm 0.00^{a}$ | $6.11 \pm 0.23^{b}$ | $4.56 \pm 1.70^{b}$ | $0.98 \pm 0.02^{a}$ | $0.49 \pm 0.00^{a}$ |
| Fat | $0.08 \pm 0.01^{c}$ | $0.07 \pm 0.02^{c}$ | $0.07 \pm 0.009^{c}$ | $0.05 \pm 0.02^{b,c}$ | $0.02 \pm 0.01^{a,b}$ | $0.01 \pm 0.00^{a}$ | $0.01 \pm 0.00^{a}$ |
| Protein | $1.29 \pm 0.22^{b}$ | $1.16 \pm 0.10^{b}$ | $1.30 \pm 0.01^{b}$ | $1.32 \pm 0.06^{b}$ | $0.52 \pm 0.01^{a}$ | $0.42 \pm 0.03^{a}$ | $0.43 \pm 0.09^{a}$ |
| Fiber | $0.22 \pm 0.07^{a}$ | $1.30 \pm 0.05^{a,b}$ | $2.95 \pm 0.15^{c}$ | $5.51 \pm 1.02^{d}$ | $1.98 \pm 0.01^{b,c}$ | $1.67 \pm 0.46^{b}$ | $1.08 \pm 0.04^{a,b}$ |
| Carbohydrate | $8.26 \pm 0.22^{b}$ | $7.65 \pm 0.25^{a,b}$ | $7.93 \pm 0.40^{b}$ | $47.39 \pm 2.17^{d}$ | $27.88 \pm 1.98^{c}$ | $9.46 \pm 0.46^{b}$ | $4.57 \pm 0.14^{a}$ |
| TPC (mg GAE/g) | $33.20 \pm 1.32^{a}$ | $112.4 \pm 5.67^{b,c}$ | $109.5 \pm 1.09^{b,c}$ | $74.00 \pm 1.14^{a,b}$ | $149.9 \pm 1.75^{c}$ | $49.00 \pm 2.46^{a,b}$ | $34.60 \pm 0.86^{a}$ |
| TFC (mg QE/g) | $57.80 \pm 0.34^{a}$ | $64.50 \pm 0.13^{a}$ | $109.00 \pm 0.26^{b}$ | $54.90 \pm 0.64^{a}$ | $63.70 \pm 1.28^{a}$ | $99.40 \pm 1.95^{b}$ | $94.90 \pm 1.00^{b}$ |

Plain Yoghurt is represented as PYOG. YOG1 and YOG2 are represented as yoghurt with 1.5% and 3.0% doum palm fruit fortification, respectively. DCON1 and DDRK1 represent doum concentrate and doum drink of higher strength, while DCON2 and DDRK2 represent doum concentrate and doum drink of lower strength, respectively. TPC – Total Phenolic Content; TFC – Total Flavonoid Content. Results are represented as mean ± standard deviation (n = 3). Values with different superscripts in the same row are significantly different at $p < 0.05$.

## Conclusion and Recommendations:

Doum palm fruit-fortified beverages showed improved nutritional and phytochemical qualities. The development of these beverages on an industrial scale could complement the innovation and enhance multi-sectoral partnerships in agriculture, commerce, and health. The beverages are recommended for the management of oxidative stress-related diseases.

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**SUB THEME: Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships (Agriculture, Health, Environment, Trade)**

# TITLE: GLYCEMIC INDEX AND GLYCEMIC LOAD LOWERING EFFECTS OF CAYENNE PEPPER GINGER TAMARIND AND TUMERIC-ENRICHED BLACK SUGARCANE JAGGERY

*Jibril MM[1]., Omajari EE[1]., Muhammad AA[1]. Unekwu-Ojo AG[1]. and Usman Z[1].
[1]Bayero University Kano (BUK)
*Corresponding Author: Jibril MM. mmjibril.bch@buk.edu.ng, +2347033971799

**Key Words:** Incremental area under the curve, glycemic index, minerals, turmeric-enriched jaggery.

**HIGHLIGHTS:**

- Lowered glycemic index and glycemic load were observed in subjects who take cayenne pepper, ginger, tamarind and turmeric-enriched jaggeries.
- Mineral composition of the enriched-jaggeries were upgraded.

**BACKGROUND AND OBJECTİVES:** Jaggery is a traditional unrefined sweetener widely consumed in developing countries, including the Northern part of Nigeria. Its high carbohydrate content contributes to rapid elevation of postprandial blood glucose, hence the focus of this work. This research aimed at evaluating the effect of enriching black sugarcane Jaggery with cayenne pepper, ginger, tamarind and turmeric on the glycemic index (GI), glycemic load (GL) and their mineral contents.

**MATERIALS AND METHOD:** Black sugarcane Jaggery was produced using the traditional open-pan boiling method as described by (1) with modifications by enrichment. Ten (10) apparently healthy adult volunteers aged 18–45 years were recruited for the glycemic index study as described by (2 & 3). Blood glucose measurements were done at 0 (fasting), 15, 30, 45, 60, 75, and 90 minutes according to (4). Each jaggery sample was digested according to (5) and digested sample was subjected to Atomic Absorption Spectroscopy for mineral analysis. The glycemic index of each jaggery was calculated for each participant using the formula according to (6) and glycemic load was calculated using the formula (7). Values obtained were statistically analyzed through one way analysis of variance and comparison between means was done through Turky HSD test.

**RESULTS AND DISCUSSION:**

The glycemic index, glycemic load and incremental area under the curve are presented in Table 1 as measured, while the calcium, iron, potassium, magnesium, manganese and zinc contents of the studied jaggery samples are shown in Table 2.

**Table 1 Glycemic Index, Glycemic Load and incremental Area Under the Curve (iAUC) of the Studied Jaggery**

| Sample | Glycemic Index (%) | Glycemic Load (%) | iAUC (mg/min/dL) |
|---|---|---|---|
| Non-Enriched | $63.50 \pm 8.20^{a}$ | $31.30 \pm 4.10^{a}$ | $1891.5 \pm 656.8^{a}$ |
| Cayenne Pepper-Enriched | $41.27 \pm 13.96^{b}$ | $20.63 \pm 6.98^{b}$ | $1130.25 \pm 331.22^{b}$ |
| Ginger-Enriched | $44.10 \pm 12.60^{b}$ | $22.10 \pm 21.30^{b}$ | $748.2 \pm 624.8^{c}$ |
| Tamarind-Enriched | $40.40 \pm 23.69^{b}$ | $20.70 \pm 11.85^{b}$ | $1033.75 \pm 508.85^{b}$ |
| Turmeric-Enriched | $33.50 \pm 14.70^{c}$ | $16.70 \pm 7.70^{c}$ | $575.1 \pm 185.7^{d}$ |

Values are mean ± standard deviation. Values with different superscripts within the same column are significantly different (P<0.05).

As presented in Table 1, all the enriched jaggery samples showed 30.6%, 35.0%, 36.4% and 47.2% reduction in glycemic index by ginger, cayenne pepper, tamarind and turmeric-enriched jaggeries respectively as compared to that of the non-enriched jaggery. This indicated that the enrichments significantly (P<0.05) reduced the glycemic index of all the participants, with turmeric-enriched jaggery having the highest reduction of glycemic index. The turmeric-enriched jaggery also showed the lowest glycemic load and incremental area under the curve as presented in the Table 1. These findings are in consonance of the findings of (8), (9) and (3).

**Table 2 Some Mineral Contents of the Studied Jaggery Samples (mg/L)**

| Element | CP-Enriched | GG-Enriched | TD-Enriched | TM-Enriched |
|---|---|---|---|---|
| **Ca** | $0.43 \pm 0.01^{a}$ | $0.73 \pm 0.02^{a}$ | $0.36 \pm 0.02^{a}$ | $7.00 \pm 0.05^{b}$ |
| **Fe** | $1.40 \pm 0.02^{a}$ | $1.33 \pm 0.01^{a}$ | $1.33 \pm 0.03^{a}$ | $2.12 \pm 0.03^{b}$ |
| **K** | $570.50 \pm 7.54^{a}$ | $603.90 \pm 9.62^{b}$ | $523.60 \pm 5.32^{c}$ | $495.70 \pm 7.81^{d}$ |
| **Mg** | $1.70 \pm 0.02^{a}$ | $1.86 \pm 0.03^{a}$ | $1.61 \pm 0.03^{a}$ | $1.96 \pm 0.04^{a}$ |
| **Mn** | $0.52 \pm 0.01^{a}$ | $0.63 \pm 0.00^{a}$ | $0.52 \pm 0.01^{a}$ | $0.50 \pm 0.03^{a}$ |
| **Zn** | $0.18 \pm 0.0I^{a}$ | $0.28 \pm 0.01^{a}$ | $0.18 \pm 0.01^{a}$ | $0.26 \pm 0.01^{a}$ |

Values are mean ± standard deviation of triplicate sample measurement. Values with different superscripts within the same column row are significantly different (P<0.05).

The potassium contents of the enriched jaggeries were found to be higher than the other minerals quantified as shown in Table 2. This is an indication that the enriched jaggeries are rich in potassium.

**CONCLUSION AND RECOMMENDATİON:** The enriched black sugarcane jaggery samples showed very high abilities to reduce glycemic index and glycemic load than the non-enriched jaggery. They also showed very high potassium content. These enrichments may be marketable innovations that further improved their functional food potentials as natural sweeteners.

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*Sub-theme: Fostering Innovation, Policy Coherence, and Multi-Sectoral Partnerships*

# Sub-national Evaluation of Nigeria's Progress towards the 2025 Global Nutrition Targets

*Adepoju A.B.[1], Ariyo O.[1]
[1]Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria.
*Corresponding Author Email: adebolaadepoju76@gmail.com Contact: +2348167947118

## Highlights

- National averages obscure substantial subnational inequities in progress toward the global nutrition targets, as demonstrated for Ethiopia's regional trajectories.[3]
- The concurrent stagnation in stunting reduction and rise in maternal anaemia risk is consistent with the persistent, under-financed burden that the 2026 Global Nutrition Report identifies as a key threat to reaching the extended 2030 targets.[1]

**Background and Objective:** Nigeria remains off-track on most 2025 World Health Assembly (WHA) Global Nutrition Targets, yet national averages mask sharp subnational inequities that are invisible in current progress reporting, leaving an evidence gap for programme targeting, resource allocation and accountability ahead of the 2030 deadline to which these targets have since been extended [1,2]. This gap matters more as recent cuts to official development assistance are projected to leave an estimated 2.3 million children without treatment for severe acute malnutrition and to contribute to roughly 369,000 additional child deaths annually worldwide [1]. This study aimed to evaluate sub-national trends in Nigeria's maternal, infant and young child nutrition indicators and estimate the average annual rate of reduction (AARR) against the WHA targets, to identify where limited resources should be prioritized.

**Materials and Methods:** A descriptive observational secondary analysis was conducted using Nigeria Demographic and Health Survey (NDHS) and Multiple Indicator Cluster Survey (MICS) data for women aged 15 - 49 years and children under 5, across three successive cycles (2011 - 2023) and disaggregated across Nigeria's six geopolitical zones. For each zone-indicator pair, the Average Annual Rate of Reduction (AARR) was derived by regressing log-transformed prevalence on survey year (AARR =1- EXP (β)) in R; where only two data points were available, a geometric-mean formula was applied [3]. Zones were classified as on-course (OC), off-track some progress (OT-SP), or off-track no progress/worsening (OT-NP) using Technical Expert Advisory Group for Nutrition Monitoring (TEAM) criteria [1,3]. Data management and visualization were performed in Microsoft Excel and referencing in Zotero.

**Results and Discussion:** Progress varied sharply by indicator and zone (Table 1). Stunting is off-track nationally and in every zone, with the poorest AARR in the South East (−2.56%), North Central (−2.31%) and North East (−2.05%). Wasting shows a clear north-south divide, with the slowest progress in the South West (−0.96%) and South-South (−0.18%) over the decade (off-track, worsening), while declining in the North West from 27.1% (2013) to 9% (2018) and continued falling to 2023 (off-track, some progress). Exclusive breastfeeding is on-course in the

South West (AARR +4.24%), North West (AARR +2.83%) and North East (AARR +2.74%), while the South-South recorded the lowest AARR. Low birth weight outcomes diverged widely, with the North West improving most (+13.76%), followed by South-South (AARR +3.72%) and North East (AARR +3.63%), while South West prevalence increased by 3.8% from baseline and remains off-track. All northern zones are on-course for maternal anaemia, whereas all southern zones are off-track, some progress. All zones are on-course for childhood overweight.

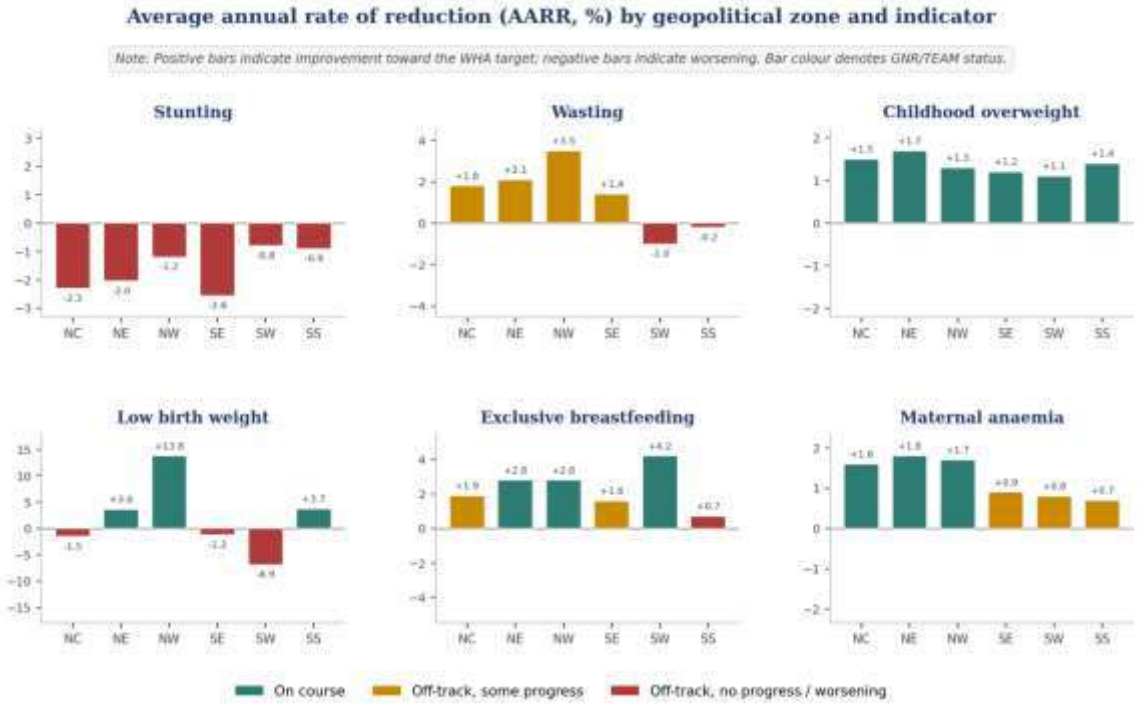



***Figure 1:*** *Average annual rate of reduction (AARR) by geopolitical zone across the six WHA targets, coloured by GNR/TEAM status. Positive bars indicate progress toward the target; negative bars indicate worsening.*

**Conclusion and Recommendation:** Subnational disaggregation shows that Nigeria's apparent national stagnation masks a real north-south divide. The North West and North East demonstrate that sustained antenatal care, micronutrient and breastfeeding-promotion platforms can shift AARR onto target trajectories. Closing the gap in the South East and South West requires policy coherence between federal nutrition targets and state-level budget allocation, and multi-sectoral partnerships that route health, food-system and social-protection resources specifically to off-track zones rather than uniformly nationwide, particularly as global nutrition financing contracts.

Keywords: Global nutrition targets, average annual rate of reduction, Nigeria

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# ODL STUDENTS ABSTRACTS

**SUB-THEME:** Innovation in clinical nutrition practices across the life cycles: Aligning Evidence-Based protocols with health system delivery

**Title:** Social Support and Adherence to Dietary Recommendations among Type 2 Diabetics Outpatients at State Hospital, Ijaiye, Abeokuta

**Name of Author(s):** Morakinyo, B.P. and Adepoju, Adeyinka Bukunmi

[1] Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture, Abeokuta, Nigeria

*Corresponding author: email: busayomorak11@gmail.com, Phone: +2347047091638*

**Keywords:**

Type 2 diabetes; Dietary adherence; Social support; Outpatients

**Highlights**

- Family-based social support was high among type 2 diabetic outpatients
- Friend-based support was generally poor despite overall high perceived support
- Social support, particularly within family and peer networks, plays a significant role in promoting dietary adherence

## BACKGROUND AND OBJECTIVES

Type 2 Diabetes Mellitus (T2DM) is a growing global health challenge, and effective dietary management remains a cornerstone of disease control. Social support is an important determinant of dietary adherence; however, evidence from Nigerian hospital settings remains limited. This study assessed social support and adherence to dietary recommendations among type 2 diabetic outpatients at State Hospital, Ijaiye, Abeokuta, Ogun State, Nigeria.

## MATERIALS AND METHOD

A descriptive cross-sectional study was conducted among type 2 diabetic outpatients at State Hospital, Ijaiye. Using Cochran's formula (prevalence = 5.05%) with a 10% non-response adjustment, 82 respondents were selected through multi-stage sampling. Data were collected using a semi-structured, interviewer-administered questionnaire covering socio-demographic characteristics, anthropometry, dietary adherence, and social support. Data were analysed using SPSS version 27, with descriptive statistics and Chi-square tests at a significance level of $p < 0.05$.

## RESULTS

Respondents were largely female (74.4%), Yoruba (90.2%), married (72.0%) and self-employed (48.8%). The mean age was 60.45 ± 10.95 years, and the mean BMI was 26.59 ± 5.76 kg/m², indicating an overall overweight status. The mean social support score was 5.84 ± 0.66, with 42.7% of respondents classified in the high-support category. Family-based support was consistently strong, whereas friend-based support was notably poor.

**Table 1: Relationship between Specific Social Support Variables and Dietary Adherence Compliance**

| Social Support Variable | $X^2$ | df | P-value | Remark |
|---|---|---|---|---|
| There is a special person who is around when I am in need | 0.957 | 3 | 0.812 | Not Significant |
| There is a special person with whom I can share joy and sorrows | 1.874 | 3 | 0.599 | Not Significant |
| My family really tried to help me | 3.856 | 4 | 0.426 | Not Significant |
| I get the emotional help and support I need from my family | 5.083 | 3 | 0.166 | Not Significant |
| I have a special person who is a real source of comfort to me | 3.968 | 3 | 0.265 | Not Significant |
| My friends really try to help me | 19.406 | 5 | 0.002 | Significant |
| I can count on my friends when things go wrong | 6.746 | 5 | 0.240 | Not Significant |
| I can talk about my problems with my family | 1.684 | 2 | 0.431 | Not Significant |

This table shows that two friend-related support items—"My friends really try to help me" and "I have friends with whom I can share my joys and sorrows" were significantly associated with dietary adherence, highlighting the contribution of supportive friendships alongside strong family support.

## CONCLUSION

This study shows that perceived social support plays a meaningful role in dietary adherence among type 2 diabetic outpatients at State Hospital, Ijaiye.

## RECOMMENDATION

Diabetes nutrition counselling in State Hospital, Ijaiye should systematically involve key family members such as spouses or primary caregivers so that they receive practical guidance on meal planning, and food choices.

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**Theme/sub-theme:** Transforming Local Food Systems for Improved Food Security and Nutrition.

**Title:** Evaluation of Heavy Metals Leached from Commonly Used Packaging Materials During Cooking in Nigeria

**Name of Author (s):** *Adekolujo O.B., Adeniyi P.O., Adeshina O.O. and Opawole, O.T.

**Affiliation of Author (s):** Department of Human Nutrition and Dietetics, Lead City University Ibadan.

*AdekolujoO.B., e-mail: adekolujo.oluwadamilola@lcu.edu.ng +2347031921401

**Keywords:** Food safety, Packaging materials, Heavy metals, Traditional moimoi leaves.

**Highlights**

- Rising demand for convenience foods increases the need for safer packaging
- Some packaging materials serve as source of contaminants and prolonged exposure to these metals has been associated with adverse health outcomes.

**BACKGROUND AND OBJECTIVES:** During steaming, heavy metals such as arsenic (As), lead (Pd), mercury (Hg), and cadmium (Cd) may migrate from packaging materials into food, posing potential public health risks. Traditional leaves may also accumulate heavy metals from contaminated soils, atmospheric deposition, and other environmental pollutants before being used as wrappers [1]. There is limited evidence on the heavy metal composition of moimoi leaves obtained from different markets and how this may influence contamination on the finished product. The study evaluates the heavy metal leached from commonly used packaging materials during cooking including *Thaumatococcus danielli* leaves, polyethene bags, plastic containers, pouches, and metal tins.

**MATERIALS AND METHOD:** The raw materials which include beans, vegetable oil, pepper, salt, onions and the packaging materials tin, leaves, polyethylene bags, aluminum pouches, plastic were purchased from Gbagi market, Ibadan. Each packaging material was thoroughly washed, the beans pudding was prepared using a standardized recipe and packaged in the different materials, all samples were cooked under the same conditions to ensure a fair comparison. Five grams of beans pudding from each packaging materials were analyzed using Atomic Absorption Spectrometry after sample digestion. Each analysis was performed in triplicate with appropriate quality control measures, including instrument calibration and blank samples. The data were

analyzed using SPSS. One–way Anova and Duncan's multiple range Test were used to compare the mean heavy concentrations, with statistical significance $p<0.05$.

**RESULTS AND DISCUSSION:** Moimoi prepared with traditional leaves had the highest arsenic and lead concentrations, while nylon recorded the lowest values. In contrast, mercury concentrations were consistently low across all packaging materials and showed no significant differences ($p > 0.05$). Cadmium levels were very low, with no significant differences among most packaging materials. These findings suggest that the type of packaging material can influence the migration of certain heavy metals into bean pudding, particularly arsenic and lead, whereas mercury and cadmium contributed minimally under the conditions of this study [2].

**Table 1: Heavy metal composition of packaging materials used in cooking bean pudding**

| SAMPLES | As(µg/kg) | Pb(µg/kg) | Hg(µg/kg) | Cd(µg/kg) |
|---|---|---|---|---|
| **A** | $23.75\pm0.02^{a}$ | $0.05\pm0.01^{a}$ | $0.00\pm0.00^{a}$ | $0.00\pm0.00^{a}$ |
| **B** | $37.80\pm0.02^{c}$ | $0.12\pm0.01^{b}$ | $0.00\pm0.00^{a}$ | $0.01\pm0.00^{ab}$ |
| **C** | $48.39\pm0.02^{d}$ | $0.20\pm0.02^{c}$ | $0.00\pm0.00^{a}$ | $0.01\pm0.00^{b}$ |
| **D** | $57.90\pm0.02^{e}$ | $0.27\pm0.02^{d}$ | $0.01\pm0.00^{a}$ | $0.01\pm0.00^{c}$ |
| **E** | $28.13\pm0.02^{b}$ | $0.09\pm0.02^{b}$ | $0.00\pm0.00^{a}$ | $0.00\pm0.00^{a}$ |

A- Nylon, B- Plastic, C- Pouch. D- Moimoi leaves, E – Metal tin; As – Arsenic, Pb – Lead, Hg – Mercury, Cd – Cadmium; Mean values with the same superscript within the same column are not significantly different ($p>0.05$).

**CONCLUSION:** Heavy metals leached from packaging materials into food with *Thaumatococcus danielli* (moi moi leaf) having the highest concentration including Arsenic, lead and cadmium and polyethylene bag recorded the lowest concentration. However, the measured concentrations were generally low when compared with WHO standards.

**RECOMMENDATION(S):** Polyethylene bag should be used as an alternative packaging material during cooking as it recorded lower concentration of heavy metals. Further studies should evaluate heavy metal in *Thaumatococcus danielli (*moimoi leaves) across different geographical locations.

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**Theme: Delivering Better Nutrition for All: Connecting the Dots across Life Cycle, Systems, and Sectors**

**Sub-theme: Precision Nutrition and Nutrients: Making the Promise a Reality**

**Title:** ASSESSMENT OF DIETARY PATTERN AND PREVALENCE OF DIABETES AND HYPERTENSION AMONG HEALTHWORKERS IN FEDERAL MEDICAL CENTRE, ABEOKUTA.

**Name of Author(s): ***Oloyede M.T., and Akinbule, O.O.

**Affiliation of Author(s):** Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State.

*Corresponding Author, E-mail: taiwooloyede28@gmail.com, Phone: +2349051452438

**Keywords:** Dietary Pattern, Diabetes, Hypertension, Healthworkers

## HIGHLIGHTS

- Gender and educational level were significantly associated with elevated BMI, abdominal obesity and hypertension.

## BACKGROUND AND OBJECTIVES

Evidence indicates that unhealthy dietary patterns contribute to weight gain, insulin resistance, endothelial dysfunction, and chronic inflammation, which are major mechanisms underlying hypertension and diabetes [1]. Nigeria is currently experiencing both nutrition transition and epidemiological transition. Traditional diets rich in complex carbohydrates and plant-based foods are gradually being replaced by energy-dense processed foods. This shift, combined with reduced physical activity, has contributed to rising prevalence of obesity, hypertension, and diabetes among working adults [2]. This study therefore assessed the dietary pattern and prevalence of hypertension and diabetes among healthcare workers in Federal Medical Centre, Abeokuta.

## MATERIALS AND METHOD

A cross-sectional design was used. A total of 342 health workers were randomly selected in each department of the Federal Medical Centre, Abeokuta. Data on medical history of hypertension and diabetes were collected using adapted WHO STEPS Surveillance Manual. Dietary Patterns were assessed using adapted food frequency questionnaire. Anthropometric measurements (weight, height, waist and hip circumference) and clinical measurements (blood pressure, fasting and random blood glucose) were assessed using standard protocols. Data were analyzed using descriptive statistics and Chi-square tests examined associations at $p < 0.05$.

## RESULTS AND DISCUSSION

Majority of the respondents were female (65.2%), married (62.9%), and earned between ₦150,000–#199,999 monthly (38.9%). Dietary pattern analysis indicated frequent consumption of refined cereals, roots and tubers, meat products, and processed foods, whereas fruits and vegetables were mostly consumed only 1–2 times weekly. Fasting blood glucose assessment showed that 81.3% had normal glucose levels, while 11.1% were prediabetic and 7.6% were diabetic. Systolic blood pressure assessment revealed that 24.6% of respondents had Stage 1 hypertension and 17.8% had Stage 2 hypertension, while diastolic blood pressure assessment showed that 14.9% and 5.0% had Stage 1 and Stage 2 hypertension, respectively. Socio-demographic factors including age and educational level were also significantly associated with CVD risk factors. These findings align with evidence that cardiometabolic risk increases

significantly with age due to cumulative exposure to unhealthy behaviours and physiological decline. [3] [4]

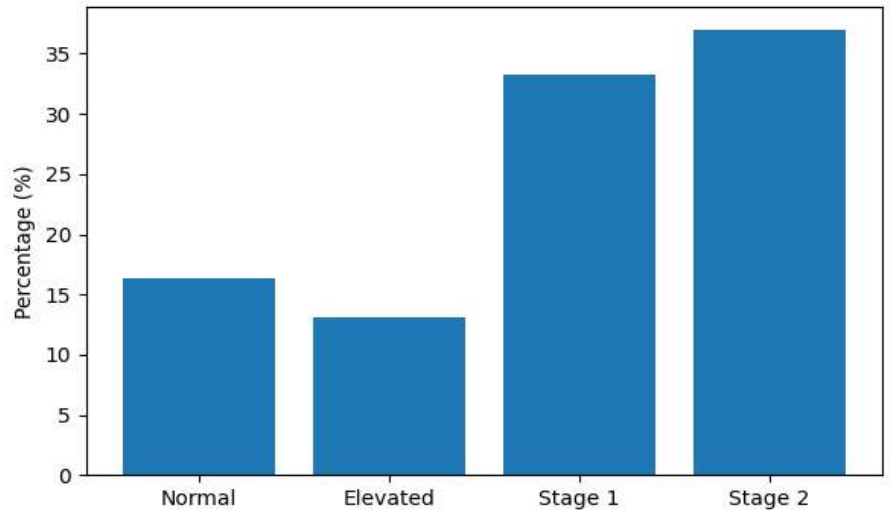



**Figure 1: Hypertension Status of Respondents**

**Table 1:** Significant associations between beverage consumption and CVD risk factors

| Beverage | CVD Risk Factor | $X^2$ (df) | p-value |
|---|---|---|---|
| Bread | Hypertension | 16.42 (5) | 0.006* |
| Bread | Elevated BMI | 28.56 (15) | 0.018* |
| Bread | Abdominal Obesity | 26.77 (10) | 0.003* |
| White rice | Hypertension | 14.68 (5) | 0.012* |
| Groundnut oil | Hypertension | 19.55(5) | 0.003* |
| Groundnut oil | Elevated BMI | 34.87 (15) | 0.003* |

## CONCLUSION AND RECOMMENDATION(S)

The study concluded that cardiovascular disease risk factors are prevalent among healthcare workers and may be influenced by dietary habits, lifestyle practices and socio-demographic characteristics. There is therefore an urgent need for targeted interventions aimed at promoting healthier dietary practices, regular screening and effective risk-factor management among healthcare personnel. It is recommended that Hospital management should establish comprehensive workplace wellness programmes that promote healthy eating, physical activity, and cardiovascular disease prevention.

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**Sub-theme:** MIYCN as a Veritable Framework for Delivering Nutrition-Sensitive and Specific Interventions across Life Stages.

**Title:** Assessment of Dietary Intake and Iron Deficiency Anaemia among Pregnant Women attending Antenatal Clinic at General Hospital Azare, Katagum L.G.A. Bauchi State

**Name of Author (s):** Hauwa Adamu, *Suleiman Ubangida, I.A.A. Ibrahim

**Affliation of the Authors:** Department of Human Nutrition and Dietetics, Federal University of Health Sciences, Azare

***Corresponding author;** e-mail: Suleiman.ubangida@fuhsa.edu.ng, +2348036848302

**Key words:** Iron deficiency anaemia, Dietary diversity, Pregnant Women and Packed Cell Volume

**Background:** Anaemia remains one of the most common nutritional and public health problems globally. Among pregnant women, approximately 40% worldwide are anaemic, with the burden being disproportionately higher in low- and middle-income countries, especially in sub-Saharan Africa (WHO, 2023). In Nigeria, anaemia in pregnancy continues to be a major concern; over 50–60% of pregnant women are anaemic (NDHS, 2023/2024). This is reflecting persistent nutritional deficiencies and inadequate maternal care.

**Aim:** This study assessed dietary intake and iron deficiency anaemia among pregnant women attending antenatal clinic at General Hospital Azare, Bauchi State.

**Materials and Method:** A cross-sectional descriptive study research design was adopted. Data on socio-demographic characteristics were collected using semi-structured questionnaire while 24-hr Dietary Recall and Food Frequency Questionnaire (FFQ) were used for the dietary intake assessment. Weight, height, and BMI of participants were used to assess the nutritional status. Packed Cell Volume (PCV) was used to determine anaemia status. A total of 227 pregnant women participated in the study. Data were analysed using Statistical Package for Social Sciences (SPSS) version 25, with results presented in means, frequencies and percentages.

**Results:** The findings revealed that, 43.6% of respondents had secondary education, primary education (22.9%) and tertiary education (17.6%), while 15.9% had only Islamic education. In terms of monthly income, the majority (68.7%) earned below N30,000 per month, while only 7.9% earned above N60,000. The Mean ± SD of PCV of the respondents was (28.6±4.1)%, and 106 respondents (46.7%) had normal PCV levels (≥33%) and were not anaemic. The remaining 121 respondents (53.3%) were anaemic, with PCV ≥33%, the moderate anaemia (PCV 21–29%)

affecting 71 respondents (31.3%), Mild anaemia (PCV 30–32%) affected 42 respondents (18.5%), while severe anaemia (PCV <21%) was observed in 8 respondents (3.5%). About 125 respondents (55.1%) had a normal BMI of average (22.0 ± 1.2) kg/m². Also about (16.3%) 37 respondents were underweight and had an average BMI of (17.1 ± 1.2) kg/m2. Table 1, revealed that poor dietary intake, particularly low consumption of iron-rich foods, is a major contributor to iron deficiency anaemia. The study also showed that anaemia in pregnancy is associated with complications such as weakness, low birth weight, and poor pregnancy outcomes.

**Table 1: Summary of key findings (N=227)**

| Finding | n (%) |
|---|---|
| **Prevalence of anaemia** | 121 (53.3) |
| **Moderate anaemia** | 71 (31.3) |
| **Mild anaemia** | 42 (18.5) |
| **Severe anaemia** | 8 (3.5) |
| **Daily consumption of spinach** | 122 (53.7) |
| **Daily consumption of beans** | 101 (44.5) |
| **Daily consumption of meat** | 65 (28.6) |
| **Daily consumption of liver** | 35 (15.4) |
| **Low dietary diversity** | 80 (35.2) |
| **Always take iron supplements** | 88 (38.8) |
| **Had malaria in pregnancy** | 110 (48.5) |
| **Received deworming** | 33 (14.5) |
| **Good knowledge (overall)** | 89 (39.2) |

**Conclusion:** The prevalence of iron deficiency anaemia among pregnant women attending General Hospital Azare is 53.3%, which is a severe public health problem driven by poor dietary intake of bioavailable iron, low dietary diversity, poor supplement adherence, high malaria burden, extremely low deworming coverage, and inadequate knowledge. It was recommended that government should intensify nutrition education during antenatal care visits.

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