



NUTRITION SOCIETY OF NIGERIA



ABEOKUTA 2022

Monday 19th to Friday 23rd September, 2022

THEME

BRIDGING THE MALNUTRITION GAP:
Nurturing Multisectoral Commitments for Sustainable Nutrition in Nigeria

CONFERENCE PROCEEDINGS:
Book of Extended Abstracts



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Profile of the Nutrition Society of Nigeria

The Nutrition Society of Nigeria is a professional, non-governmental association founded in 1963 at the University of Ibadan. Her membership cuts across various disciplines. These include, Nutrition, Agriculture, Biochemistry, Physiology, Medicine, Food Science and Technology, Social Sciences, Home Economics and Education.

Membership categories are as follows: Ordinary, Associate, Student, Fellow, Honorary and Corporate.

OBJECTIVES OF THE SOCIETY

- a. To promote and foster the study of Nutrition in its widest sense
- b. To provide a common forum for physiologists, biochemists, clinicians, agriculturists, food technologists, economists, public health workers, dietitians and any other group professionally qualified in disciplines related to nutrition to exchange information and ideas
- c. To pursue these objectives by meetings and publications and by cooperation with other organizations having similar aims
- d. To serve as a professional body in Nutrition and food science that can offer authoritative advice when called upon to do so

AFFILIATION, CONTACT, COOPERATION AND NETWORKING

The Nutrition Society of Nigeria is an affiliate of

the International Union of Nutritional Sciences (IUNS). She is in contact with other Nutritional Societies in the African Region through Federation of African Nutrition Society (FANUS). The Society also recognizes the importance of exchange of ideas with colleagues outside the region and therefore utilizes every opportunity for contact and networking with other Nutrition Societies outside the African region.

The society has linkage with:

- A. Government Agencies
 - National Committee on Food and Nutrition (NCFN)
 - Relevant Ministries/ Agencies
- B. Institutions of Higher Learning (Universities, Polytechnics, Colleges of Education/ Agriculture etc. especially Nutrition Training Institutions)
- C. Societies e.g. NIFST, Home Economics Association, Nigerian, Nigerian Dietetics Association etc
- D. Research Institutions
- E. Food and Beverages Industries
- F. National/ International NGOs and NGDOS

FUNDING

The nutrition society of Nigeria is a non-profit making professional organization depending mainly on membership subscriptions and donation from collaborators including international Agencies, Corporate bodies and from professional services.

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- A. Maternal, Infant and Young Child Nutrition
- B. Planning, Policy, Advocacy and Accountability
- C. Agriculture, Nutrition, Food Systems, Environment and Health
- D. Food Composition and Consumption Studies
- E. New Approaches in Nutrition Research

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PC34	Assessment Of Micronutrient and Antinutrient Composition of Succulent Raw And Cooked Silk Cotton (<i>Ceiba Pentandra</i>) Leaves	Benneth-Ugochukwu, I.C and Adepoju, O.T.
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PC37	Determinants of Malnutrition among Under-five Children in Epe Local Government Area of Lagos State	Wahab N.O., Adeosun P.Y., Arogundade M.E., Olunusi P.A & Subair T.
OC38	Prevalence and Awareness of Hypertension among Artisans in Two Local Government Areas of Ebonyi State, Nigeria	Onyeji, G.N, Ifeanacho, M.O, Ikpemo, K.O, Benneth-Ugochukwu I.C, Ufebe, O.G
OC39	Evaluation of sex-gender differences in the dietary behaviour, fruit and vegetable intake knowledge, and their associations with hypertension	Oluwafunke O. Akinbule, Precious U. Maduabuchi, Temitayo K. Olurin and Solomon T. Kareem
OC40	COVID-19 confinement/lockdown impact on food consumption pattern, physical activity and perceived body weight changes of undergraduates from selected three tertiary institutions in Southern Nigeria	Gideon O. Itheme, Anuoluwapo F. Taiwo, Okeoghene E. Makanjuola, and Netochukwu P. Onwubuya
PC41	Anthropometric Characteristics and Risk Factors of Type II Diabetes Mellitus among Normoglycemic Non-Academic Staff of Rufus Giwa Polytechnic, Owo	Omoniyi Isaac, Olanrewaju, and Oluwakemi Lamidi, Abayomi A. Fasasi
PC42	Proximate Composition and Sensory Properties of Complementary Produced from Maize, Soybean, and Tiger nut Flour Blends	Osisanya, J.O, Olatidoye, O.P and Jumbo H. C.

ABSTRACTS ID	ABSTRACTS TITLE	AUTHORS
OC43	Effectiveness of Nutrition Education Intervention in modifying the Theory of Planned Behaviour Constructs for Intake of Soft Drink with Meals among Secondary School Adolescents in Abia State	Nkwoala, C.C., Uwaegbute, A.C. and Anyika-Elekeh, J. U.
PC44	Body Mass Index And Quality Of Life Of Adults Living With Hiv In Selected Hospitals In Abeokuta, Ogun State	Olayiwola I.O., Onabanjo O.O., Edun B.T., Quadri J.A
OC45	A Pilot Gardening and Nutrition Education Intervention to Improve School-Age Children's Knowledge, Preference and Consumption of Traditional Green Leafy Vegetables in Ibadan, Nigeria	Ejoh S. I, and Enwelum, N. L.
PC46	Independent Effects of Age and Energy Expenditure on Obesity among Adults in Abeokuta, Ogun State, Nigeria	Adekoya, A. S, Ojo, C. I, Ijaya, O. B, Opelami, O. A, Oyeleke, F. O
PC47	Impact of Nutrition Education on Automatic Fruit Selection Behaviour of Adolescents from Selected Secondary Schools in Abia State, Nigeria	Nkwoala, C.C., Uwaegbute, A.C. and Anyika-Elekeh, J. U.
OC50	Lifestyle Characteristics and Health Status of Road Transport workers in Abeokuta, Ogun state.	Ume-Ezeoke Victoria N., Akinbule Oluwafunke O. and Adenusi, Sultan A.
OC51	Household Food Insecurity and Undernutrition Among Children Aged 6 -59 Months in Ibadan, Southwestern Nigeria	Soyode, S., Eyinla, T.E., and Samuel, F.O.
OC52	Understanding the interactions between sustainable food systems and nutrition in Nigeria: A systematic review and Meta analysis.	Oko-Isu, A., Afolabi, W. A. O., and Brai, B. I. C.
OC53	Consumers' purchase reactions to perceived food price changes in Nigeria during COVID-19 outbreak	Iheme G.O., Adile A.D., Egechizuorom I.M., Kupoluyi O.E., Ogbonna O.C., Olah L.E., Enuka H.C., Idris H., Asouzu N.C., and Oyebamiji E.A.
OC54	Assessment of Socio-economic Status and Food Situation in Households during Covid-19 Pandemic Lock-down in AMAC, Federal Capital Territory, Abuja – A Descriptive Study	Uchendu F. N. and Ibakwa T.
PC55	Anthropometric Status and Food Diversity of Peasant Farmers in Katagum (Azare) Local Government Area of Bauchi State	Adesanya O.D, Lateef O.J, Balarabe, S. T and Bridget Ebu

SUB-THEME D: FOOD COMPOSITION AND CONSUMPTION STUDIES

ABSTRACT ID	ABSTRACT TITLE	AUTHORS
OD1	Knowledge, Attitude, Lifestyle and vegetable consumption pattern among civil Servants in Delta State.	Odo C. C., Ibekwe I. M., Odo A. C.
OD2	Evaluation of nutritional composition, functional and sensory properties of complementary food made from sprouted beans and malted maize composite flour	Oluwafunke O. Akinbule, Anuoluwa O. Soretire, Adebukola T. Omidiran, Elizabeth O. Ajilo, Taiwo R. Adedoyin, Samuel K. Sosanya, Oluwakemi A. Ojo
OD3	Effect of processing on the nutrient composition of some sorghum (sorghum bicolor L. Moench) products	Muhammad Dikko, A., Thondre, P.S and Tanko O.O
OD5	Comparative Analysis of the Proximate Composition of Wheat- whole Tiger nut Biscuits baked with margarine and avocado paste	Patricia Ukegbu, Nnenna Elechi Obasi, Onwuzuruike Uzochukwu Anselm, Martina Ogah, Ijeomaokereke, Nwamadi Precious, Chinyere Echendu
PD6	Proximate composition, Antinutritional factors, minerals analyses and Invitro antioxidant potentials of Orange fleshed sweet potato (OFSP) leaves	Oboh, Henrietta. A. Chinma, Chiemela, and Oseren, Kingsley
PD7	Proximate Compositions Of Selected Locally Vended Street Snacks Commonly Consumed In Ogun State	Alaba, K.E and Osi, A.A
OD8	Assessment Of The Glycemic Index Of Meal From Unripe Plantain (Musa Paradisiaca)	Ajayi Oluwafunmike H., Oladosu Gbenga S., and Bolajoko Opeyemi O.
OD9	Methods of Fruit Ripening: Effect on the Nutrients Content	Akinola O.O, Uthman-Akinhanmi Y.O, Opreh P.O, Mosimabale M.M, Akinyemi A.O, Oguntade O.I, Hammed I.O.
OD10	Evaluation of some selected Properties of Sprouted yellow maize, Lentils and Aiden composite flour as a Functional Ingredient in Snacks	Omidiran, A.T., Boladale N.M., Akinbule O.O., and Sobukola O. P
OD11	Proximate composition, Antinutritional factors, minerals analyses and Invitro antioxidant potentials of Orange fleshed sweet potato (OFSP) leaves	Oboh, Henrietta. A. Chinma, Chiemela , and Oseren, Kingsley,
OD12	Metabolic Energies of some Selected Snacks from South-Western Nigeria	Uthman-Akinhanmi, Y.O., Olayiwola, I.O, Okolosi, J.E, Ademiluyi, D.D and Akinlose E.A.
OD13	Development Of Nutrient-Dense Breakfast Food From Blends of Acha, African Yam Bean And Tigernut	Alabi O. D., Adeyemo G. A., Olawuyi Y. O., Quadri J. A., Ogunleye E. A., Bolarinwa I. F., Babarinde G.O., and Akinwande B. A.

ABSTRACT ID	ABSTRACT TITLE	AUTHORS
OD14	Dietary Pattern and Prevalence of Overweight and Obesity among Undergraduates of Federal University of Agriculture, Abeokuta.	Olojede I. A., and Onabanjo O. O.
OD15	Fatty Acid Profile and Cholesterol Contents of Selected Indigenous Foods Consumed in Rural Communities of Southwest Nigeria	Odukoya, K.F, Sanni, S. A., Olayiwola, I. O. and Sobukola, O.P.
OD16	Proximate composition and sensory characteristics of gluten- free finger millet-soya bean snacks	Adeosun F.F and Okonkwo J.C.
PD17	Evaluation of Phytochemical and Anti-nutrient Compositions of Yoghurt Produced from Bambara nut (<i>Vigna subterranean</i>) and Tiger nut (<i>Cyperus esculentus</i>)	David-Chukwu, N. P., Ogbuji, C. A., Onuabuci, I.C.
PD18	Influence of Dietary Ginger (<i>Zingiber officinale</i>) Fiber on the Physicochemical, Antioxidant, Microbiological and Sensory Properties of Functional Maize Pap (ogi)	Adeoti, O.A., Alabi, A.O., Adegoke, O.A and Adebayo-Alabi, I.B
PD19	Nutritional Knowledge and Consumption of Functional Foods among Public School Teachers in Ife Central Local Government Area of Osun State, Nigeria	Igbaro, J. O. and Omikunle, I. O.
PD20	Dietary pattern of Iron-rich food consumption and prevalence of malnutrition among In-school adolescents in two LGAs in Southwestern Nigeria	Olodu M.D, Ehinafe S.
OD21	Awareness and Consumption Pattern of Biofortified Foods and Its Products Among Urban Residents of Odeda Local Government Area, Ogun State, Nigeria.	John E. P., Adenle T. A and Bolajoko O. O
OD22	Mineral analysis and sensory evaluation of cookies produced from unripe plantain, green peas and coconut for older adults	Adeoso A.O., Jimoh F. A., and Olaleye H.T.;
OD23	Factors Influencing Adherence To Dietary Recommendations Among Type II Diabetes Patients Attending Federal Medical Centre, Idi Aba, Abeokuta	Adepoju, A. B. and Gabriel, E
PD24	Nutritional and Microbiological Assessment of Yellow Maize Vended At Aroma Awka Anambra State	Ibekwe I. M., Chukumbah E. C., Ndife Rachael C. Ozoh. C. N
PD25	Evaluation of Nutrient Composition of Raw and Cooked Indigenous Achi (<i>Brachystegia eurycoma</i>) Seed Used As A Soup Thickener	Onuabuchi I.C, David-Chukwu N.P & Ogbuji C.A

ABSTRACT ID	ABSTRACT TITLE	AUTHORS
PD26	Nutritional, Functional and Sensory attributes of Ready-to-use Cocoa beverage	Yusuf A. B. and Muhammad I. M.
OD27	Effect of heat treatment on chemical composition of African nutmeg (<i>Monodora myristica</i>)	Ani, P. N., Agbo E. C. and Uzoma, M. C.
OD29	Assessments of Sugar Sweetened Beverages Intake and Body Mass Index of Male Name of Author (s): Undergraduate Students Moshood Abiola Polytechnic, Ojere, Abeokuta, Ogun State.	Awolola J Tunde, Ademiluyi D Dare, Onabanjo O Oluseye, Oladoyinbo A Catherine and Otuonye S Victory
OD30	Comparison of Proximate Composition and Sensory Evaluation of Fufu Powder and Dough Produced from TMEB 419, TMEB 693 and IBAO 11371 Cassava Varieties	Deniran I.A, Balogun O.O, Akinduro W.O, Oyegbade, S.A and Oyelere O.E
OD31	Trends of Postprandial Blood Glucose Level and Glycemic Index of Subjects Fed with Meals Prepared from Breadfruit.	Olufelo A. T., Olayiwola I. O., Onabanjo O. O., and John E. P.
OD32	Nutritional Knowledge, Fruits and Vegetables Consumption Pattern Among Civil Servants in Ogun State.	Adebayo, Y. O., Odufuwa, B. A., Akinsanya, O. B., and Alinonu, C. P.
OD33	Mineral Analysis Of Danwake Produced From Composite Flour	Bako H.K, Ameh. A, Okoruwa A and Isyaku. I
OD34	Effect of Consumption Of Pigeon Pea (<i>Cajanuscajan</i>) Meals On Postprandial Blood Glucose Of Healthy Adults In Ogun –State.	Omilani T., Afolabi W.A.O., Olayiwola I., Adeofun C. and Ilori O.
OD35	Physicochemical and Sensory Properties of Locally Produced Digestive Biscuit from two Varieties of Wheat (<i>Triticum spp</i>)	Petrol, B.B, Hashim, H, Abubakar, F.Y and Modu, S
OD36	A bread produced from Carrot, Fermented Maize and Tiger Nut Residue Flour Blends for food security.	Nzeagwu O.C., IHEME G.O and Onyeonu B.A.:
PD37	Nutrient and Sensory Attributes of puff-puff Produced from Composite Flour of yellow Cassava, Orange flesh sweet potato and Sesame seed	Olanrewaju, Omoniyi I, Alebiosu, Ibidayo. A., Akiode Peter and Roland-Ayodele, M.A
OD38	Functional, Nutritional Composition and sensory attribute of Cocoa Based Beverage Produced from Cocoa beans, Soybean, Sorghum leaves and Date fruit	Yisa, O. Oyinloye., Ukah Omowumi, H, Adedayo, E, Oyeyemi Olanrewaju, Omoniyi I.,

ABSTRACT ID	ABSTRACT TITLE	AUTHORS
OD39	Nutrient composition and sensory properties of tofu coagulated with tamarind and exposed to different heat treatments.	Ezenwa H.C., Itheme G.O., Okonkwo E.M., Ugwu L.N., Nweke C.C. and Okegbe D.C.
OD40	Evaluation of proximate, minerals and functional properties Complementary Foods Prepared from Germinated Millet (<i>Pennisetum glaucum</i> L) with Groundnut (<i>Arachis hypogaea</i> D) and <i>Moringa oleifera</i> Flour Blends	Awogbenja Makanju Dehinde and Ndife Joel
OD41	Food consumption Pattern of under-five Children Attending Pediatric Outpatient Department of Federal Medical Centre (FMC) Abeokuta, Ogun state	Akinsanya O.B, Adebayo Y.O, Olutayo K.O, Fojude F.T., and Azeez A.O
OD42	Effects of domestic food processing methods on proximate composition of Six Mungbean (<i>Vigna radiata</i>) flours, Mungbean and Cowpea porridge.	Ezecheta Cecilia Chika
PD43	Food Consumption Pattern of Under-Five (6-59) Months Old Children Attending Infant Welfare Clinics in Federal Medical Centre, Abeokuta, Ogun State	Akinsanya, O.B, Adebayo Y.O, Agwai, M.C and Onifade O.F
OD44	Determination of Fatty Acid Profile of Selected Fish Species Consumed in Akwa Ibom State, Nigeria.	Udo, A. U., Alozie, Y. E. and Friday, M.B.
OD45	Meal Pattern And Micro Nutrient Adequacy Of Food Consumed By Secondary School Female Adolescents In Ibadan	Okeya M. O, and Balogun O.O
OD46	Evaluation of Nutritional and Sensory Qualities of Biscuit Produced from Flour Blends of Wheat, Pigeon Pea and Carrot.	Abayomi F.Q., Akinbule O.O., Ademiju O.O., Omidiran A.T.
OD47	Nigerian Food Composition Table: need to compile version 2	Sanusi, RA, Ene-Obong H, Enujiugha V, Ariyo, O, Eyinla, TE

SUB-THEME E: NEW APPROACHES IN NUTRITION RESEARCH

ABSTRACT ID	ABSTRACT TITLE	AUTHORS
OE1	Polyphenol content, antioxidant activity, physical and sensory properties of functional cake made from wheat-maize composite flours enriched with cocoa (<i>Theobroma cacao</i>) powder	Alabi, A.O., Adeoti, O.A., Olatidoye, O.P and Azeez, L.A
PE2	Knowledge and Perception of Undergraduate Students towards Nutrigenomics for Personalized Nutrition in Federal University of Agriculture, Abeokuta, Ogun State	Dare D. Ademiluyi., Ibiyemi O. Olayiwola., Ebenezer P. John., Yewande O. Uthman-Akinhanmi., Boluwatife T. Oyewumi., Emmanuel A. Akinlose., Godsfavour O. Odukoya., and Miracle A. Ademola.
PE3	Assessment of Nutritional Knowledge, Dietary Habits and Oral Health Practices of Undergraduate Students in Lead City University Ibadan, Nigeria	Aleru E.O, Akinrefe O.A and Bodunde I.O.
OE4	Effects of <i>Citrus aurantifolia</i> (lime) and <i>Cymbopogon citratus</i> (lemongrass) extracts on hyperlipidaemia induced male albino rats.	Etchie B. L; Nwamarah J.U; Maduforo A, and Odo C. C,
OE5	Not as bad as portrayed! Scoping review of ultra processed foods and the application of Nova Classification System in Nigeria	Iheme, G.O, Nzeagwu, O.C, Ezenwa H.C, and Anyika-Elekeh J.U

ABSTRACTS FOR PLENARY SESSION

PLA1

USAID Integrated Health Program Applies Quality Improvement Framework To Address Early (1st hour) Initiation of Breastfeeding

Dr. Sa'adatu U. Ibrahim Ringim

Integrated Health Program supported by USAID and operated by Palladium

Integrated Health Programme (IHP) combined on-site competency-based clinical training, mentoring, routine supportive supervision, data analysis, and performance review meetings with primary health care (PHC) staff, Monitoring and Evaluation experts, and local government stakeholders. Cross-cutting nutrition practices were embedded in child, maternal and postnatal care visits. In less than two years, IHP-supported facilities recorded an increase of 1st hour breastfeeding from 10% of live births in IHP-supported health facilities (in 2020) to 90% (in 2022) across PHCs in Bauchi, Kebbi, Sokoto, FCT, and Ebonyi States. These increases were in tandem with Antenatal Care, Skilled Birth Attendance, and Post Natal Care according to Nigeria District Health Information Software 2 (DHIS2).

PLA2

Using Multi-Stakeholder Collaboration Strategies to Improve Vitamin A Supplementation Coverage in Six States of Nigeria

Philomena Orji¹, Delphine Danboyi², Faith A. Ishaya³, Chinedu Okoye⁴

Helen Keller International

According to the World Health Organization¹, vitamin A deficiency is a public health problem affecting about one-third of the children aged 6 to 59 months in 2013, with the highest rates in sub-Saharan Africa (48 percent) and South Asia (44 percent). One of the ways Nigeria addresses vitamin A deficiency in under-five children is through vitamin A supplementation during routine immunization and the maternal, newborn, and child health week (MNCHW) campaign. These programmes are designed along the continuum of care model to strengthen Nigeria's health system. The objective of the study was to improve the coverage of vitamin A supplementation through the multi-stakeholder collaboration for better health, and to reduce morbidity and mortality. The study locations include Adamawa, Akwa Ibom, Benue, Ekiti, Nasarawa and Taraba states. To improve coverage, an active engagement on SMART advocacy, robust SBCC strategies (compartmentalized for urban and rural mobilization), robust capacity building (provision of learning tool kits, job and memory aids, and a comprehensive intervention plan: microplanning, implementation, real-time data entry, collation, visualization, and validations) were conducted with the following MNCHW stakeholders - community leaders, security agencies, universal basic education, religious groups, media, health workers, non-governmental organization partners and ministries, department, and agencies in planning, monitoring, and supervision. This intervention led to improved average administrative data coverage across the six implementing states from 43.65 to 93.45%. It has also increased government ownership.

References: World Health Organization. Vitamin and Mineral Nutrition Information System (VMNIS). Micronutrient Database (<http://www.who.int/vmnis/database/en/>).

PLA3

Improving Nutrition through Innovation and Actions for Social Behaviour Change in Nigeria

Angela Samba and Shittu Abdu- Aguye

Breakthrough ACTION- Nigeria

Nigeria made uneven gains in addressing undernutrition as shown by indicators in recent years. The stunting prevalence remained at 37% in 2013 and 2018. Wasting prevalence decreased from 18% in 2013 to 7% in 2018 (NDHS 2013 & 2018). The prevalence of exclusive breastfeeding, in children under 2 years who received pre-lacteal feeds and minimum acceptable diets remain 29%, 49%, and 11% respectively (NDHS 2018). USAID Breakthrough ACTION Nigeria used a human-centered design formative assessment to understand the determinants of health and nutrition in Nigeria (Bauchi, Kebbi, Sokoto, Ebonyi, and FCT). Insights from the assessment were used to codesign integrated Maternal, Newborn, Child Health, and Nutrition (MNCH+N) Social Behaviour Change (SBC) interventions to address behaviors at different levels of the socioecological model (SEM). From 2019 to 2021, community volunteers reached 156,739 pregnant women and 1,470,305 caregivers with children under 5 with nutrition interventions. They referred 3744 children to treatment for Sever Acute Malnutrition (SAM) and 847 completed the referrals. Ward Development Committees (WDCs) and Women Empowerment Groups (WEG) across the intervention states support food demonstrations and promote the establishment of home and community gardens within the communities. While these SBC interventions affected both intermediate and behavioural outcomes, program success is also supported by the ability of the service delivery systems to effectively meet beneficiary needs. The project's Behavioural Sentinel Survey (BSS) showed an improvement in nutrition ideation and behaviours at midline compared to baseline.

PLA4

Knowledge, Attitude and Practice (KAP) Study on malnutrition-related issues among under-five children in PLHIV households of Akwa Ibom and Bayelsa States, Nigeria

Doreen Magaji¹, Selya Tyav², Peters Adekoya², Christopher Aruku²

¹United States Agency for International Development ²Centre for Clinical Care and Clinical Excellence

The World Health Organization (WHO) estimated that about twenty million children worldwide suffered from severe acute malnutrition (SAM) in 2010. The National Demographic and Health Survey (NDHS) 2018 report, indicated that the nutritional status of children under age 5 in Nigeria is poor: 37%; rural areas (46%) and urban areas (27%). In Akwa Ibom and Bayelsa States, around 45% of deaths among children aged Under 5 are linked to under-nutrition in spite of rich vegetation in these states. Malnutrition makes a child vulnerable to childhood illnesses: diarrhea, pneumonia, malaria, and other conditions prevent them from reaching their full developmental potential.

USAID through The Integrated Child Health and Social Services Award (ICHSSA) 1 projected supported a cross-sectional study conducted from March to April 2022 on PLHIV households in 12 LGAs in Akwa Ibom and Bayelsa States. A total of 768 participants were selected from households that have at least 0-59 months old children, a pregnant or lactating mother, and a caregiver. Two-staged cluster sampling based on probability proportional to size. The sample size calculation was based on the prior estimated desired precision of 95%CI, a 5% margin of error, and a 50% response distribution. Data was collected on a self-developed close-ended questionnaire

coded in Open Data Kit (ODK) formatted on Android and smartphone tablets. The households were also assessed for nutritional status based on MUAC measurement and other on variables such as age, sex, oedemas, MUAC, vaccinations, Vitamin A coverage, presence of Cholera and diarrhea, etc. Responses were analysed using ENA for SMART and SPSS software using descriptive statistics.

The prevalence of malnutrition as per MUAC among U5 children is higher in Bayelsa (20.6 %; SAM is 7.9%) than Akwa Ibom (15.8%; SAM is 7.6%) at 95% CI. This rate is higher in girls: 19.1 % than boys 11.8% in Akwa Ibom but rather higher in boys (22.6%) than girls (18.4%) in Bayelsa State. Few children are initiated into breastfeeding within the first one hour of birth: Akwa Ibom (56%) and Bayelsa (54%). Averagely, 37.5% of children 6-23.9 months in the 2 states met the minimum dietary diversity during the survey period. Most women of childbearing age are not educated: Secondary education only (AKS: 58.5%, BYS: 62.0%); did not attend school: AKS (4.0%) and BYS (6.4%). Malnutrition based on MUAC (<190mm) among women (15-49) years was high Akwa Ibom (0.5%) and Bayelsa (0.2%); lactating women at risk of malnutrition was equally high (AKS:10.6%) and (BYS: 15.6%). The sources of drinking water for the household were generally unsanitary as mostly AKS: 68.4% and BYS: 57.1% use boreholes or other open water sources such as streams and rainwater. About 21% of households do not have household toilets in Akwa Ibom, out of which 85.1% of them practice open defecation (Bush: 57.5%, Gutter: 1.3%, and waterside: 26.3%). Similarly, for 42% of households who do not have household toilets in Bayelsa, 74.3% practice open defecation (Bush: 14.7%, Short put: 1.9%, and waterside: 57.7%). Although many caregivers in Akwa Ibom (90%) and Bayelsa (76.3%) have a good knowledge of Diarrhoea, respondents affirmed their children have not had any episode of Cholera in the last 6 months, and their Under-5 children never received Vitamin A supplement from the health facility.

Knowledge on the importance of good nutrition practices is high among respondents but households carrying out these practices are few. This disparity between knowledge and practice needs to be addressed through the appropriate interventions that target caregivers and provides practical skills targeting poor household nutritional practices. In addition, nutrition programs in these areas need to adequately target household interventions to include addressing childhood malnutrition and sanitation through the use of locally available resources.

PLA5

Sustainable Dietary Change through Agri-Food System Transformation: A Simulation Analysis of Agricultural Value Chain Growth in Nigeria

Dr. Olivier Ecker

Senior Research Fellow, International Food Policy Research Institute, Washington DC.

Food systems have the potential to nurture human health and support environmental sustainability but are currently threatening both. Providing a growing population with healthy diets from a sustainable food system is an immediate challenge for Nigeria. Poor-quality diets are associated with all forms of malnutrition. There is a broad consensus that food system transformation for sustainable healthy diets is urgently needed. However, there is little systematic knowledge of how to transform food systems, and which interventions are effective, especially at a large scale. In Nigeria, agriculture and agricultural policy have a particular role to play in transformation because of the sector's size in the national agri-food system. This presentation discusses how agricultural growth, driven by different value chains, may affect the quality of Nigerian diets. The simulation analysis uses a modelling framework that combines an economy-wide model with a household-level food demand system model and a microsimulation model to ex-ante assess the likely dietary impacts of different agricultural value chain growth scenarios. The simulation results suggest that agricultural growth is driven by increased productivity in the dairy, pulse, and vegetable value chains and has the greatest potential to promote healthy diets, relative to the current agricultural growth path. The estimated dietary changes under these three value chain growth scenarios have also positive effects on the water footprint of food consumption in Nigeria. The presented analysis provides quantitative evidence that can inform food system policymaking, particularly for prioritizing agricultural policy options for healthier and more sustainable diets.

PLA6

Identifying Locally Available Foods through Community Consultations: A sustainable approach to promoting and utilizing safe, nutritious, and diverse foods.

Ebenezer Amuwaoluwa Oluloto, Hadiza Joy Marcus, Michael Daniel Eveshoyan, Chukwuma Anene, Kazeem Adebayo, and Pauline Adah

USAID Advancing Nutrition

Food and Nutrition insecurity has become a major challenge in Nigeria. The need to diversify access to nutritious food is crucial. To identify priority food groups or value chains and identify specific knowledge, capacity, and input gaps affecting their availability and promotion. The study was conducted in Sokoto, Kebbi, and Bauchi States, Nigeria. A desk review of existing literature was conducted to identify pre-selected value chains/food groups and gain a greater understanding of regional contexts in relation to opportunities for acceptance, production, utilization, and dietary value. stakeholder consultation. USAID Advancing Nutrition held two workshops involving 170 value chain actors including Government of Nigeria line ministries, farmers, wholesalers, food processors, off-takers, and vendors. In the first workshop, priority value chains or food groups were selected and a ranking system was used to select and prioritize these food groups using predetermined criteria such as; nutritional value, the longevity of storage, cultural acceptability, the potential for increased consumption, production potential (particularly for smallholder producers), gender sensitivity, ease of processing (level/type of processing), the potential for Income generation, and adaptation to climate change. The food groups selected were classified under staples, legumes, vegetables, fruits, and animal protein. The second workshop was composed of the same participants as the first workshop and they identified motivating and mitigating factors in the promotion and acceptance of these priority foods. Rice and millet were the highest ranked staple, though a majority of the participants were aware of staples like bio-fortified crops like Quality protein maize (QPM) and Orange Fleshed Sweet Potatoes (OFSP), they do not know how to access them. Support for groundnut, watermelon, spinach, moringa, goat, and poultry production, processing, and consumption was the general consensus of all the participants in improving food and nutrition security. All women suggested that crops that can easily be cultivated, maintained, and processed by women without negatively affecting their time and energy to care for their children should be prioritized. The stakeholders also considered crops that could increase women's income generation and empowerment opportunities when there is excess produce for sales. Finally, considering Northern Nigeria, women have limited ownership of land, prioritization is also considered nutrient-rich crops that can be cultivated within available land size by women, especially at the smallholder level. In summary, the choice and prioritized food crops were similar across the three states however, there were some peculiarities on the basis of the different agroecological zones and preferences across the states. Challenges identified range from insecurity in the region to low access to improved production inputs and postharvest handling practices.

PLA7

Harnessing Traditional Food Markets as a Sustainable Source for Safe, Nutritious Foods: EatSafe in Nigeria Program Approach

Dr. Augustine Okoruwa

Head of EatSafe Country Programmes, Global Alliance for Improved Nutrition (GAIN)

Feed the Future's Evidence and Action Towards Safe, Nutritious Foods (EatSafe) is a five-year program that seeks to enable lasting improvements in the safety of nutritious foods in traditional markets. The program directly benefits consumers, vendors, and other market actors in traditional food markets. It indirectly targets low-income consumers as a group, who are likely to purchase a significant share of their foods in traditional markets.

Beyond consumers and vendors, we expect to reach both men and women, children and adolescents. Funded by the United States Agency for International Development, the program implementation is led by the Global Alliance for Improved Nutrition, a Swiss foundation working in Africa and Asia to increase the consumption of safe, nutritious foods. Other partners include the International Livestock Research Institute, Pierce Mill Entertainment and Education, and Busara Center for Behavioral Economics. The program is being implemented in two phases: Formative Research (Phase I) and Intervention Implementation and Learning (Phase II). EatSafe in Nigeria targeted Kebbi State for the formative research. Learnings from the formative research were combined to identify obstacles and opportunities for food safety interventions in traditional food markets in the target States of Kebbi and Sokoto. EatSafe has developed four flagship interventions to fill knowledge gaps and generate new evidence on how best to increase consumer demand for safe, nutritious foods in traditional markets. The interventions have been pre-tested and are now at the Implementation Phase. This presentation provides an update on key findings from the formative research activities conducted and lessons learned. These include the Review of Food Safety Policy and Assessment of Food Safety Legislation in Nigeria, Stakeholder Mapping, Review of Citizens engagement on food safety in Kebbi State, the Focused Ethnographic Study, cohort study, story sourcing, channel analysis, risk assessment, and other qualitative research. The four interventions that have been pre-tested for implementation are highlighted.

PLA8

Using “Fish for Food” – A High Impact Strategy to Provide Layered Health Services to Hard-To-Reach Communities in Akwa Ibom State, Nigeria

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One in five children in Akwa Ibom State are malnourished, the prevalence of Global Acute Malnutrition (GAM) as per mid-upper arm circumference (MUAC) among children 6-59 months based on the integrated food security phase classification (IPC) and the world health organizations (WHO) classification is 15.8% and that of SAM is 7.6%. Less than one-third (31.1%) of children met the minimum requirement for dietary diversity, 32% lacked access to a toilet and 57.5% practiced open defecation (with 57.5%, 1.3%, and 26.3% defecating in the bush, gutter, and waterside respectively), while 37% are out of school. Also, 30.8% of lactating mothers (15-49 years) had MUAC between 190 – 230mm. Furthermore, it was observed that the children lacked good parental care, they live without sufficient food making most sleep hungry; some rather stay around the riverside to pick up small fish and crabs to prepare food for themselves. They lack personal hygiene, are exposed to mosquito bites, and have limited access to WASH services. With long distances to a health facility, self-medication and health complications are rife, there were high rates of infectious diseases including malaria and sexually transmitted diseases, and above all high HIV incidence rates.

USAID through its implementing partner Center for Clinical Care and Clinical Research (CCCRN) community OVC program, piloted a targeted integrated community outreach involving the clinical and social service workforce aimed at providing a one-stop-shop for case finding for HIV/AIDS and other related health issues (including addressing malnutrition in children) to hard-to-reach areas which are mostly creeks. This community does not have a health post and community members have to travel long distances using locally produced boats to access the nearest health post. In collaboration with clinical service providers who work in mobile testing teams that include multi-disciplinary team members, the project outreach team held entry meetings to elicit buy-in from key community stakeholders and mobilized and secured health commodities to be used to target clients. The strategy was to first hold focused meetings with key community stakeholders (for their buy-in and support) and then set up workstations and subsequently provide medical consultations for common ailments like malaria and HIV testing. The team also provided free health talks and offered nutritional assessment and counseling services, practical food demonstration, deworming, support for SAM cases (with Locally prepared RUTF), micronutrient supplementation, and supported clients with anti-malarial drugs, mosquito nets, and referral to health centers for other follow up health services that were identified during the community outreach.

At the end of the community outreach, a total of 250 clients were reached. Of the 50 children reached 12 (24%) were HIV-positive clients who already knew their status but had never disclosed it, 3 new cases were identified; all

the HIV+ children were malnourished, and 8 had advanced chronic fungal infections. In addition, 32(66%) of the children had stunted growth and 118 people (47.2%) of the participants tested positive for malaria using a rapid diagnostic test. Informal interaction with the caregivers about how people spent the income derived from fish sales revealed that people use their monies for burial parties, and transactional sex, which they barely use for securing household wellbeing or addressing health needs.

Periodic outreaches in remote communities involving a multi-disciplinary team in the management of endemic infectious diseases will promote access to quality health services. Working directly with stakeholders will support buy-in and increase real-time case identification, improve community trust, and referral to health services.

Keywords: Orphan and Vulnerable Children, Malnutrition, People Living with HIV, Dietary diversity

PLA9

Leadership Development for Accelerated Progress in Nutrition in Nigeria (LEDA-NN)

LEDA-NN Collaborators – South Africa and Nigeria

Nutrition leadership is essential for creating an enabling environment that will accelerate nutrition actions and improve nutrition outcomes. With persistent high rates of malnutrition in Nigeria, despite available institutional/policy frameworks and years of efforts to improve nutrition, improving local nutrition leadership capabilities is imperative. LEDA-NN is a two-year project, funded by the Bill and Melinda Gates Foundation (January 2022 to December 2023) to support the development of a critical mass of multisector nutrition leaders in Nigeria and builds on the experience of the African Nutrition Leadership Programme. The project involves a series of three intensive, face-to-face, residential, experiential learning workshops that will be held five to six months apart; with the first workshop held in two cohorts. Sixty, multisectoral, mid-career professionals, out of 244 applicants, were selected to participate in LEDA-NN.

The content of workshop 1 addresses leadership orientations, insights, and attitudes to navigate stakeholder dynamics and lead change efforts in nutrition in Nigeria. Workshops 2 and 3 integrate leader development and technical capacity-building content that addresses the use of evidence to promote and advocate for change. In between workshops, participants will implement their workshop learnings and complete assignments relevant to their work environments.

The overall design of the workshop series is based on a framework that posits that successful leadership development requires elements of Assessment, Challenge, and Support. Thus, participants will undergo several formal assessments and assess themselves through critical self-reflection during and in between workshops. A variety of challenges are offered to participants during and in between workshops, and LEDA-NN offers full-time, on-site support during workshops and remote support between workshops when participants are applying their learning and completing assignments. Workshop 1 for the first cohort of participants was held in August 2022. The workshop improved self-awareness of leadership strengths and weaknesses, and improved confidence to lead. The workshop further initiated a change in participants' perceptions about leadership and the characteristics of leaders and introduced participants to the practice of reflection as a tool for developing leadership potential. Participants described their experiences as educative, inspirational, and transformational.

PLA10

Food-Based Approaches informed by Positive Deviance Inquiry to Sustainably Address Malnutrition (Poster)

Dr. Sa'adatu U. Ibrahim Ringim

Integrated Health Program supported by USAID and operated by Palladium

Using findings from a rapid Positive Deviance Inquiry (PDI) with well-nourished children in food insecure environments, Integrated Health Program (IHP) identified local foods and recipes to inform food-based approaches to address malnutrition in the Primary Health Care settings. A total of sixty-six (66) households were selected in three (3) communities. Mid-Upper Arm Circumference (MUAC) and weight-for-age were used to identify well-nourished children. Foods used by these households included enriched bean porridge, soups, nuts, seeds, and locally/wild-grown fruit and vegetables. Notably, well-nourished children in Sokoto ate grasshoppers as snacks, or ground and mixed them into foods like pap, or added to meals for protein.

PLA11

Using Organizational Capacity Assessment Tool analysis to inform capacity strengthening plan for State Committee for Food and Nutrition in Bauchi, Kebbi, and Sokoto States (Poster)

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USAID Advancing Nutrition

Addressing malnutrition in Nigeria requires a multisectoral approach. The State Committee for Food and Nutrition (SCFN) remains a key player in coordinating food and nutrition interventions across states in Nigeria. The need to assess the capacity of the SCFN to perform oversight functions in nutrition activities was identified during the scoping exercise for USAID Advancing Nutrition Nigeria. As a result, the project embarked on a capacity assessment of the SCFN in its three states (Bauchi, Kebbi, and Sokoto States) of implementation. The assessment aimed to assist the SCFN to prioritize where it should focus its improvement efforts, and decide on responsibilities and timeframes. A facilitated self-assessment using Organizational Capacity Assessment Tool (OCAT), revised by USAID Advancing Nutrition, was adopted to draw insights from the leadership and members of the SCFN in the three (3) states. The tool provided a framework that facilitated individual reflections about their organization's trajectory and helped stakeholders identify shared concerns and priority actions. Findings from the SCFN capacity assessment for the three (3) states revealed a minimal capacity to effectively perform functions. Areas for improvement were noted in the lack of functional committees at the local government area level, inadequate funding, and poor monitoring and evaluation (M & E) systems. Some key actions identified to address these areas of improvement include advocacy to the government and developing a resource mobilization plan for improving funding, reactivation of the Local Government Committee for Food and Nutrition, and development of M & E systems for SCFN.

The State Committee for Food and Nutrition in the three (3) states requires substantial support to improve overall performance. Key actions identified to address these areas for improvement include advocacy to the government for improved funding, reactivation of the Local Government Committee for Food and Nutrition, and developing M & E systems for SCFN.

ISN01

Individual and Contextual Determinants of Early Initiation of Breastfeeding in Healthy Neonates in Selected Primary Health Facilities in Imo State

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Keywords: Breastfeeding, Implementation Science, Early Initiation

BACKGROUND AND OBJECTIVES: Early initiation of breastfeeding (EIBF) within 1 hour of birth has the potential to reduce the number of deaths recorded among neonates. The NDHS 2018 reports a poor EIBF practice rate of 39.4% and 37% within South East, Nigeria and Imo state, respectively. In the wake of the huge lacuna that exists between evidence and practice, this study sought to leverage on the potential of implementation science in nutrition¹ in exploring the individual and contextual determinants of EIBF practice in selected PHCs in Imo state.

MATERIALS AND METHOD: A descriptive exploratory qualitative study design was employed. Semi-structured individual interviews and focus group discussions were used to explore individual and contextual determinants of EIBF practice. A total of 8 health workers and 66 mothers were recruited using the purposive sampling technique. Qualitative data in form of transcripts were analysed using the QDAMiner Lite software. Thematic analysis involving organizing, classifying and summarizing texts was adopted and codes were used to classify texts into their appropriate categories.

RESULTS AND DISCUSSIONS: A key observable insight from the results of this study gives credence to the fact that the multifactorial determinants affecting breastfeeding practice calls for the need to have measures in place at various levels to promote, protect and support breastfeeding among women.²

CONCLUSION AND RECOMMENDATION: These findings further confirm the need for public health education to go beyond awareness creation to greater and continuous investment in improving knowledge of both the mother and supporting agencies (family members and service providers).

Table 1 Mothers' Perception on Barriers and facilitators to the practice of early initiation of breastfeeding.

Barriers of Early Initiation of Breastfeeding	Facilitators of Early Initiation of Breastfeeding
Delayed milk flow	Baby crying
Lack of knowledge on subject matter	Educating mothers on the benefits of EIBF
No support from midwives and nurses	Knowledge of mothers on EIBF and its benefits
Mothers' health status	Support from midwives and nurses
Complications during delivery	Affordability
Mother and mother-in-law influence	Good health status
Personal Beliefs	

Table 2 Health Workers' Perception on Barriers and facilitators to the practice of early initiation of breastfeeding.

Barriers of Early Initiation of Breastfeeding	Facilitators of Early Initiation of Breastfeeding
Delayed milk flow	Educating mothers on the benefits of EIBF
Rhesus incompatibility	Training of Health Workers
No support from midwives and nurses	Support from midwives and nurses and health workers concerned with delivery process
Mothers' health status/ Complications during delivery	Health workers knowledge on EIBF and its benefits
Institutional limitations during delivery process	Rooming-in
Mother and mother -in-law influence	
Personal Beliefs of mothers	
Lack of training and appropriate work tools	
No record of EIBF	
Delivery via cesarean section	
Mothers lack of knowledge on the benefits of EIBF	
Poor motivation/excessive workload	

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ISN02

Effect of Behaviour Change Communication and Reminder Strategies on Adherence to Iron-Folic Acid Supplementation Among Pregnant Women in Kano

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Keywords: Iron-folic acid supplementation, anaemia, reminder, adherence

BACKGROUND AND OBJECTIVES: Anaemia in pregnancy is a public health problem particularly in Nigeria (1). Iron-folic acid supplements (IFAS) are currently provided free to pregnant women in Kano State during antenatal care (ANC). However, adherence remains low over the years (2). This study assessed the effectiveness of behaviour change communication and reminder as strategies to improve adherence to IFAS supplementation in Kano.

MATERIALS AND METHODS: Pregnant women (n = 143) were randomly assigned to one of four intervention groups for three months as follows:

Group	Intervention Given			
	IFAS	BCC	Reminder to Woman	Reminder to Husband
I	Yes	Yes	Yes	No
II	Yes	Yes	No	Yes
III	No	Yes	No	No
IV	No	No	No	No

Haemoglobin concentration was measured before and after intervention. IFAS pill counts ≥ 90 were recorded as “adhered” at the end of the interventions and otherwise as “not adhered”.

Table 1: Level of Adherence within interval of study and relationship with change in haemoglobin concentration

	Adherence Level		% Adherence	Mean difference in [Hb] (95% CI)	P-Value
	Adhered (≥ 90)	Not Adhered (<90)			
Intervention I (n=44)	32	12	72.7	0.329(-0.346-0.995)	0.569
Intervention II (n=60)	49	11	81.7	1.049(0.428-1.669)	0.000*
Information (n=20)	11	9	55.0	0.115(-0.755-0.985)	0.986
Control (n=19)	7	12	36.8	Reference	

* mean significantly different compared to control. Hb = Haemoglobin Concentration

RESULTS AND DISCUSSION: Results (Table 1) showed that intervention group II resulted in the highest adherence (81.7%) to IFAS intake and showed significant ($p < 0.001$) increase in haemoglobin level when compared with control group. This suggest that involvement of husbands could be a good strategy to improve adherence to IFAS. This agrees with previous studies (3, 4) which linked involvement of husbands to a variety of favourable maternal health outcomes, including reduced postpartum depression, increased use of health-care services and higher rates of competent delivery attendance. Alternative tactics are required to guarantee that women and their families are aware of the necessity of supplements and that they remember to take it (5).

CONCLUSION AND RECOMMENDATION: Based on the findings of this study, reminder (especially involving husband) could be a good strategy to improve adherence to IFAS among pregnant women thereby contributing to the reduction of anaemia in pregnancy. Development of policy to mainstream husbands' involvement in routine maternal healthcare for better outcomes is strongly recommended.

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Effect of counseling and text message reminders on the uptake and adherence of iron and folic acid supplements among pregnant women attending antenatal clinic in Gwagwalada, Abuja

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Keywords: Adherence, Iron-folic acid, Counseling, Text message reminders.

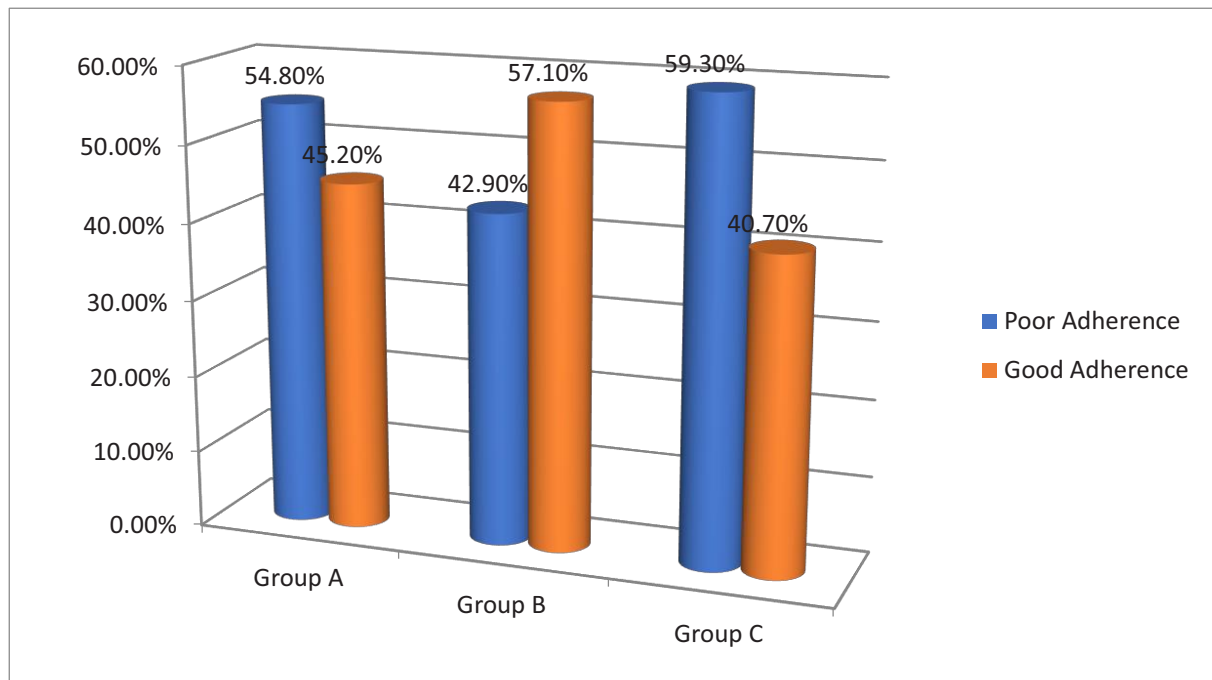
BACKGROUND AND OBJECTIVES: Poor compliance is a significant cause of low Iron-Folic Acid Supplementation uptake and adherence. Therefore, there is an urgent need to address these factors affecting compliance and develop innovative strategies to mitigate them. The study aimed to assess how Iron-Folic Acid counselling and Text message reminders could improve the uptake and adherence of Iron and Folic Acid Supplements among pregnant women attending antenatal clinics.

METHODS: This study used a type-2 effectiveness implementation hybrid design with a quasi-experimental technique. Respondents who met the selection criteria and gave consent were purposively selected into the various study groups. A total of 153 respondents were recruited into the study groups, counselling alone (Group A), counselling and text message reminder (Group B), control (Group C), each having 51 respondents, and 4 health care practitioners involved in antenatal clinic counselling at the intervention health facility. Parametric and nonparametric analyses were utilized to evaluate survey results across the two intervention groups while controlling for various demographic and socioeconomic variables, including the health facilities used.

RESULTS AND DISCUSSION: The perceived acceptability, appropriateness and feasibility of the counselling intervention from the perspective of respondents in group A was 100%, 99%, and 94%, respectively, while that of group B that received the counselling and text message reminder intervention was 97%, 96%, and 96% respectively. The perceived acceptability, appropriateness, and feasibility of the intervention strategies deployed from the perspective of the HCPs were 62%, 75%, and 50%, respectively. Self-report adherence to IFAS was 71.96 ± 13.62 in group B, 68.02 ± 11.56 in group A, and 65.19 ± 11.84 in group C. Analysis of variance showed no significant difference in the mean score, but post-hoc test showed a significant difference in the mean score of respondents in group B and C ($p=0.036$). Folic acid pill count adherence was 91.62 ± 7.98 in group B, 89.61 ± 8.62 in group C, and 88.57 ± 14.10 in group A. Analysis of variance in mean score showed that the difference between the groups ($p>0.05$) was not statistically significant. Iron supplement pill count adherence was 91.29 ± 8.03 in group B, 89.36 ± 8.86 in group C and 88.55 ± 14.00 in group A. The difference in pill count adherence mean score was not statistically significant between and within the group ($p>0.05$). Respondents in group A were 2.56 times more likely to have poor folic acid pill count adherence when compared to group B, respondents in group A were 3.96 times more likely to have poor Iron pill count adherence when compared to group B, respondents in group A were 1.62 times more likely to have poor self-report adherence when compared to group B.

CONCLUSION: The synergy of counseling and text message reminder is an effective strategy for improving the uptake and adherence of Iron and Folic Acid supplements among pregnant women attending antenatal clinics.

Figure 1: IFAS Self-report adherence among study Groups



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ISN04

Effect of Iron-Folic-Acid Supplementation on Haemoglobin Levels and Anaemia Status among In-school Adolescents in Zaria, Kaduna State

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BACKGROUND AND OBJECTIVES: Anaemia is a global public health problem which causes irreversible and adverse effects on cognitive, mental and growth improvement, work performance and physical capacity as well as serious impact throughout the reproductive years of life [1]. Iron-folic-acid (IFA) supplementation is recommended by world health organisation (WHO) for adolescent girls to improve their haemoglobin concentrations and reduce the risk of anaemia and iron deficiency [2]. This study was aimed at determining the changes in haemoglobin levels and anaemia status before and after IFA supplementation among in-school adolescents in Zaria.

MATERIALS AND METHOD: The research was a cohort study design which was followed-up for a period of 12 weeks and involved 142 adolescents from secondary schools in Zaria where 139 adolescents completed the study. About 2 ml of blood sample was collected by a trained phlebotomist from each participant so as to estimate the haemoglobin levels before and after intervention. The intervention involves a single dose of weekly IFA supplements per participants for 12 consecutive weeks.

RESULTS AND DISCUSSION: This study reported 76.8% prevalence of anaemia among the adolescents before the intervention which is of severe public health significance according to World Health Organisation (Figure 1a). However, the prevalence of anaemia among the adolescents after intervention decreased to 24.5% (Figure 1a). The results also revealed that the concentration of haemoglobin was significantly ($p = 0.001$) higher after the intervention among the adolescents compared to the haemoglobin levels before intervention (Figure 1b). This was similar to the reports from other studies (including WHO's recommendation) that oral iron supplementation leads to increase in iron status (relative to haemoglobin level) among adolescents[3,4].

CONCLUSION AND RECOMMENDATION: The study concluded that weekly IFA supplementation remarkably reduced the prevalence of anaemia and improved haemoglobin levels among in-school adolescents in Zaria. It is recommended that relevant stakeholders as a matter of urgency should consider and initiate the weekly IFA supplementation among adolescents especially in schools as this would help in reducing the effects of anaemia and lost productivity in later stage of adulthood

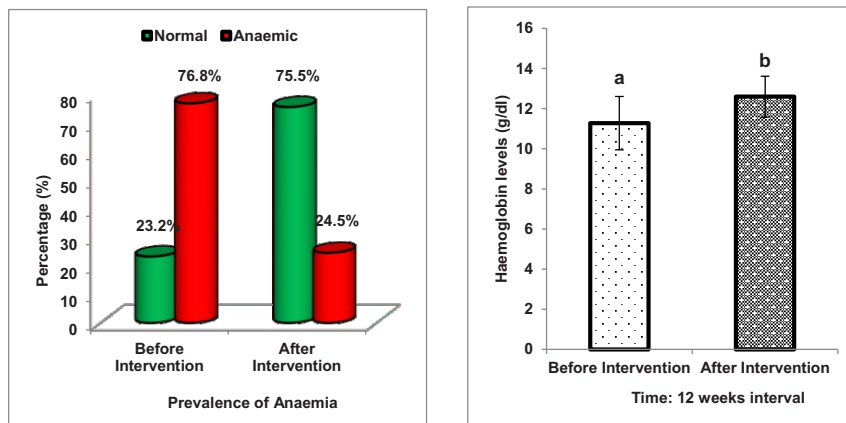


Figure 1: (a) Prevalence of anaemia before and after intervention among in-school adolescents in Zaria; (b) Haemoglobin levels before and after intervention among in-school adolescents in Zaria

(a) Values are expressed as percentages of adolescents with anaemia and normal ($n = 142$ and 139 : before and after intervention respectively). Male and female adolescents (15-19 years) with haemoglobin levels less than 13.0 g/dl and 12.0 g/dl respectively are termed anaemic according to WHO. (b) Values are expressed as Mean \pm SD of 142 and 139 participants before and after intervention respectively; Values with different superscript alphabets on separate bars are significantly different, Wilcoxon Signed Rank Test, $p = 0.001$.

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Assessment of Nutrition-Sensitive Programming in Non-Humanitarian Food Assistance Lagos State.

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Keywords: Food assistance, nutrition-sensitive approaches, organizational readiness, food insecurity

BACKGROUND AND OBJECTIVES: Food assistance programmes (FAPs) are important food system elements for vulnerable households in humanitarian and non-humanitarian contexts. Demand for and implementation of FAPs has increased, even with the COVID-19 pandemic. Although FAPs can improve nutrition outcomes, they will not automatically do so but must be deliberately harnessed for nutrition. Nutrition-sensitive FAPs need to increase. Home to >20 million people, and Nigeria's economic capital, Lagos is a prime destination for internal migration and has communities of vulnerable populations. This study assessed the capacity and readiness of organizations implementing FAPs to integrate nutrition-sensitive approaches in their programme implementation.

MATERIALS AND METHODS: The study used a cross-sectional, mixed-methods approach. Eight organizations that met eligibility criteria were sampled. The capacity at these organizations, as well as barriers to nutrition-sensitive programming, were assessed using an observation and programming checklist and key informant interviews. Also, the programming checklist assessed the current practices and operations of FAPs and organizational readiness to integrate nutrition-sensitive approaches in programme implementation. FAPs' practices were further assessed from the beneficiary perspective by conducting a survey with 100 beneficiaries of FAPs across the 8 organizations. The survey used an interviewer-administered questionnaire and also assessed beneficiary food insecurity, nutrition knowledge, and sociodemographic characteristics. Survey data were analyzed using SPSS 20. Food insecurity was classified as none/minimal, stressed, or crisis, based on Cadre Harmonisé manual 2.0 reduced Coping Strategy Index (rCSI) thresholds. Thematic analysis of interviews was conducted using NVivo version 13. A scoring system adapted from the Impacting Gender and Nutrition through Innovative Technical Exchange in Agriculture project (IGNITE) diagnostic tool was used to assess organizations around domains encompassing nutrition policy and approach; organizational culture; budget; data collection and analysis; use of evidence; and mitigation of potential harm. Organizations were then categorized into one of five categories of nutrition sensitivity – *Nascent*, *Emergent*, *Expanding*, *Advanced* or *Institutionalized*. Readiness scores were assigned to each participating organization based on responses from the programming questionnaire and interviews, and stage of organizational readiness was determined, using the anchored rating scales of the six dimensions of the Community Readiness Model.

RESULTS AND DISCUSSION: Programme beneficiaries had been receiving food assistance for an average of 12 months and 77% had stressed to crisis levels of food insecurity. High food prices were the primary reported reason that influenced reliance on FAPs. Foods received included rice, instant noodles, spaghetti, wheat meal, semolina, and coarse-grained cassava flour (*garri*). Beneficiaries' nutrition knowledge was low and less than 50% reported receiving any education about healthy eating as part of FAPs. Organizations implementing FAPs reported limited existence of documented protocols or guidelines for FAPs implementation and an absence of government guidelines around FAPs. Seven organizations had no internal nutrition personnel and had never collaborated with external personnel. Readiness for nutrition-sensitive programming was generally low across organizations as only one of the sampled organizations showed the highest level of readiness being at the *Initiation* stage (indicating deliberate nutrition actions), followed by the *Preparation* stage in another organization (process for adopting nutrition-sensitive approaches was underway). Two organizations were categorized at each of the *Preplanning*, *Vague Awareness*, and *Denial/Resistance* stages. Generally, gender and nutrition policies, targeting, approaches, budget, data collection and use, and organizational culture were either non-existent or were not systematic. Six of the eight organizations were *Nascent* in nutrition sensitivity, indicating that their capacity for addressing nutrition and nutrition-sensitive programming was underdeveloped or absent. One organization was *Emergent* (capacity is in progress but underdeveloped) and the last

organization was expanding (capacity is moderately developed). Key capacity challenges included limited nutrition knowledge and competencies among programme implementers; low collaboration; insufficient funding; and inadequate storage and other infrastructure.

Table 1: Key Indices from the organizations KII, readiness level and nutrition sensitivity classification

FAP Organization Identifiers	Core Focus	Protocol and Policy Documents	Structure of the Organization	Stage of Readiness	Nutrition Sensitivity Classification
Organization 1	Hybrid	Not seen / Unavailable	Not structured	<i>Preplanning</i>	<i>Nascent</i>
Organization 2	Hybrid	Not seen / Unavailable	Not structured	<i>Denial/Resistance</i>	<i>Nascent</i>
Organization 3	FAP-focused	Not seen / Available	Partially structured	<i>Preparation</i>	<i>Emergent</i>
Organization 4	FAP-focused	Seen / Available	Well-structured	<i>Initiation</i>	<i>Expanding</i>
Organization 5	Hybrid	Not seen / Unavailable	Not structured	<i>Vague awareness</i>	<i>Nascent</i>
Organization 6	FAP-focused	Not seen / Unavailable	Not structured	<i>Denial/Resistance</i>	<i>Nascent</i>
Organization 7	FAP-focused	Not seen / Unavailable	Not structured	<i>Preplanning</i>	<i>Nascent</i>
Organization 8	Hybrid	Not seen / Available	Partially structured	<i>Vague awareness</i>	<i>Nascent</i>

FAP-Focused – Organization is focused primarily on food assistance services; Hybrid – Organization is focused on providing both food assistance alongside other services like medical intervention, skill acquisitions and empowerment, mentoring and financial support

CONCLUSION AND RECOMMENDATIONS: Overall, the findings from this study highlight that studied FAPs in Lagos are inadequately designed to improve the nutrition situation of their beneficiaries, and organizations implementing FAPs do not have sufficient motivation or capacity to increase nutrition sensitivity in the short term. Increasing nutrition knowledge and competencies, as well as fostering collaboration among programme implementers may increase nutrition-sensitive readiness and actions in organizations implementing FAPs. The study suggests a need for guidelines to direct non-humanitarian FAPs in Nigeria, and perhaps other low- and middle-income countries, and greater nutrition accountability of organizations delivering non-humanitarian FAPs.

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Note: Certain aspects of this research have been submitted elsewhere. However, this is a comprehensive report from the study.

National Homegrown School Feeding Program Improved the Dietary Diversity and Food Insecurity of School-Aged Children in Zaria, Nigeria.

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Keywords: Dietary diversity, food insecurity, national homegrown school feeding program, Zaria

BACKGROUND AND OBJECTIVES: High level of malnutrition is reported among school-aged children (SAC) in Nigeria. Malnutrition may make it difficult for a child to perform in school and be productive later in life. The national home-grown school feeding program (NHGSFP) aims to improve enrollment and the nutritional status of SAC in Nigeria [1]. The impact of NHGSFP on the dietary diversity and food insecurity of the SAC in Zaria remains to be documented, to the best of our knowledge.

MATERIALS AND METHODS: The study was a school-based comparative study in which the dietary diversity and food insecurity of the enrolled children (n = 263) were compared with those of the non-enrolled children (n = 217). Household food insecurity and dietary diversity of the subjects were assessed using the FANTA Household Food Insecurity and Access Scale (HFIAS) and household dietary diversity guide, respectively. HFIAS and dietary diversity scores were converted into categories of food insecurity and dietary diversity, respectively. In-depth interviews and observations were carried out to appraise the barriers to the implementation of NHGSFP. Quantitative data obtained were analyzed using the SPSS version 21 and expressed as mean±SD or percentages. Independent t-test was used to compare the mean HFIAS and DDS and $p \leq 0.05$ was considered statistically significant.

RESULTS AND DISCUSSIONS: Figure 1 depicts the food insecurity of the subjects. Non-enrolled subjects had a higher HFIAS score compared with the enrolled subjects (Fig. 1A). Similarly, food insecurity rates were higher among the non-enrolled subjects (Fig. 1B). Our findings conform with findings from other studies [2, 3]. Improved food security seen among the enrolled subjects could be attributed to the fact that NHGSFP is a food distribution program in which the beneficiary pupils are provided with one meal every school day to complement what they receive at home. Figure 2 shows the dietary diversity of the subjects. The enrolled subjects had a significantly higher DDS (Fig. 2A). The majority of non-enrolled subjects had low dietary diversity (Fig. 2B). What we found has been reported from similar studies on school feeding programs [2, 4]. The higher DDS and dietary diversity seen among the non-enrolled subjects could be attributed to the SFP because it provides them with food groups that may not be part of their home meals.

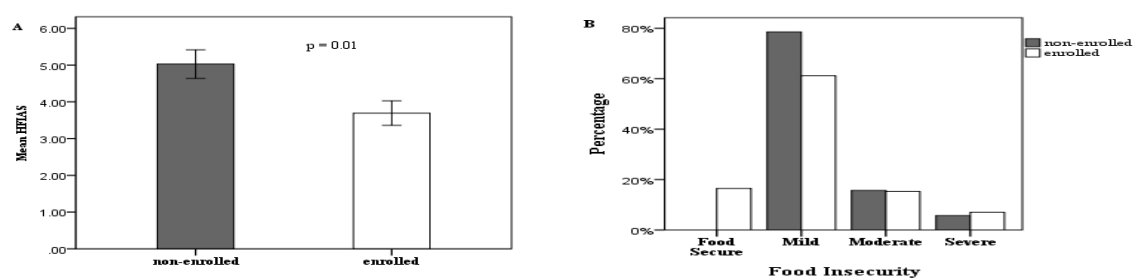


Figure 1: Food Insecurity of School Age Children Enrolled and Non-enrolled in NHGSFP in Zaria (A: Mean household food insecurity and access scale, HFIAS; B: Prevalence of food insecurity)

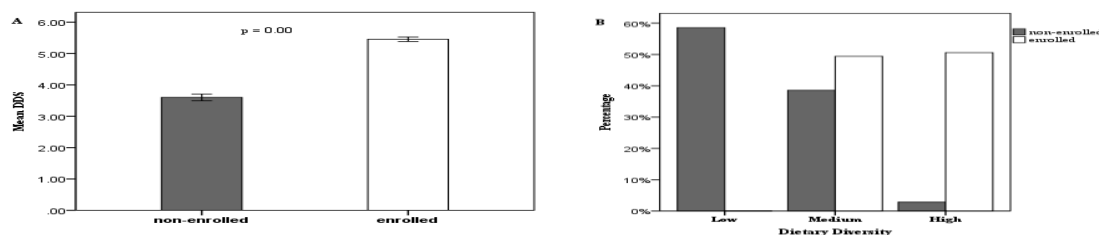


Figure 2: Dietary Diversity of School Age Children Enrolled and Non-enrolled for NHGSFP in Zaria (A. Mean DDS; B. Distribution of dietary diversity).

Some barriers to the implementation of NHGSFP identified include:

1. Failure of the food vendors to comply with the menu and portion size standards.
2. Unavailability of some cooking ingredients in the market, for example, green leafy vegetables.
3. Teachers' interference with the food distribution thus leaving some students with little food.
4. Intermittent implementation of the program due to some administrative procedures.

Conclusion and Recommendation: The NHGSFP has improved the food insecurity status and dietary diversity of the SAC in Zaria-Nigeria. Therefore, we recommend proper supervision, sustenance, and institutionalization of the program as it has the potential to improve the overall health and nutritional status of the SAC.

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ISN07

Assessment Of Barriers And Promoters For The Adoption of Orange - Fleshed Sweet Potato In Kano State, Nigeria

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BACKGROUND AND OBJECTIVES: Vitamin A deficiency account for 25% of children fewer than six years of age from Nigeria, deficient nutrients have been added to staple food crops through biofortification in order to curtail the menace of micronutrients deficiency(1). Orange-fleshed sweet potato (OFSP) is biofortified and is rich in *b*-carotene, addition of orange-fleshed sweet potato (OFSP) to the food environment is an effective nutrition-sensitive agricultural approach to improve vitamin A intakes. However, the adoption of this biofortified crop merits further study. This research assessed knowledge, attitude and adoption of OFSP among farmers in Kano State.

MATERIALS AND METHOD: Data were collected using questionnaire, focus group discussions (FGDs), in-depth interview to 125 respondents from farmers' consumers and some HODs in ministry of health and Agriculture, eHealth Agent, CIP agent, Head of vines production CDA, chairman POGMAN, CDA farm manager and many more that were selected through purposeful and simple random sampling. Mean, frequencies and percentages of data collected were analysed.

RESULT AND DISCUSSION: Table 1 describes the promoters to the current challenges causing lower cultivation of OFSP among farmers in the area, moreover questionnaire result shows that OFSP is less (<30%) preferred by farmers compared to traditional white-fleshed and yellow-fleshed sweet potatoes. Choice preference shows that majority of farmers and consumers valued the WFSP more than the OFSP and the YFSP, This finding is in consistent with consumer preferences studies carried out by (2 and 3), another major factor that affected the area put under OFSP cultivation, is the number of households engaged in its production were shortage of planting materials and drought stress which is in line with the findings delivery of OFSP in Tanzania (4).

CONCLUSION AND RECOMMENDATIONS: The level of adoption of OFSP in appears very low (<30%) among the respondents. Concerted efforts by all stakeholders is required in addressing the constraints, barriers through education and behaviour change communication and adequate investment into the cultivation of OFSP.

Table 1: Summary of factors for promotion of adoption of OFSP

SN	Variables
1	Availability of market niche
2	Affordability, Availability and Access to OFSP vines
3	Moderate price of inorganic fertilizer, herbicides and Planting materials
4	Pleasant taste and improve texture
5	Increase awareness and sensitization on health benefits of OFSP
6	Resistance to pest and Improve shelf life
7	Promotion of local vines production system

Keywords: Vitamin A deficiency, Biofortification, Orange-fleshed sweet potato and farmers

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ABSTRACTS FOR PARALLEL SESSION (ORAL AND POSTER)

SUB-THEME A: MATERNAL, INFANT AND YOUNG CHILD NUTRITION

OA1

Assessing the infant and young child feeding practices and anthropometric status of under-two children in Abeokuta, Ogun State, Nigeria

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KEYWORDS: Breast-feeding, Complementary Feeding, Malnutrition, Under-two Children

BACKGROUND AND OBJECTIVE:

Infant and young child feeding (IYCF) practices have been shown to directly influence the health and nutritional status and hence the survival of under-two children [1]. The knowledge of the existing feeding practices and its association with anthropometric characteristics of children is crucial to developing interventions targeted at improving the health and nutritional status of infant and young children. This study was therefore designed to assess the infant and young child feeding practices and anthropometric status of under-two children in Abeokuta, Nigeria.

METHODOLOGY: A descriptive cross-sectional survey of 569 apparently healthy under-2 children was conducted in the three local government areas of Abeokuta. Respondents were selected using a simple random sampling. Breastfeeding and complementary feeding indicators were assessed using the 2021 WHO guidelines for assessing infant and young child feeding practices. Anthropometry was assessed using standard procedures. Data were analyzed and presented using frequency count, percentages means and standard deviations. Pearson's correlation was used to assess relationship among variables.

RESULTS:

INFANTS AND YOUNG CHILD FEEDING INDICATORS AMONG THE RESPONDENTS

Most (84.2%) of the children were within ages 6-24 months. Two-third (69.3%) of the children were ever breastfed, 46.7% were initiated to breastfeeding within one hour of birth, 23.0% were exclusively breastfed for the first two days after birth. More than half (58.1%) of the infants within the age-range of 6-8 months were introduced to solid, semi-solid or soft foods. Less than 20.0% of the children of ages 6-23 months achieved the minimum dietary diversity and acceptable diet while less than 10.0% of them achieved minimum meal and milk feeding frequency (Table 1).

Table 1: Infants and young child feeding indicators among the respondents

	Breastfeeding indicators	Age (months)	Frequency	Percent
1	Ever breastfed (n=569)	0-24	351	69.3
2	Early initiation of breastfeeding within one hour of birth (n=569)	0-24	266	46.7
3	Exclusive breastfeeding for the first 2 days after birth (n=569)	0-24	131	23.0
4	Exclusive breastfeeding under 6 months (n=62)	0-5	36	58.1
5	Mixed Milk Feeding under 6 months (n=62)	0-5	25	40.3
6	Continued breastfeeding at one year (n=372) Complementary feeding indicator (n=506)	12-23	90	24.2
7	Introduction to Solid, Semi-Solid or Soft Foods (6 – 8 months)	6-8	98	58.0
8	Minimum dietary diversity met	6-23	60	11.9
9	Minimum meal frequency	6-23	37	7.3
10	Minimum milk feeding frequency	6-23	34	6.7
11	Minimum acceptable diet	6-23	85	16.8
12	Egg and /Flesh food consumption	6-23	131	25.9
13	Sweet Beverage Consumption	6-23	105	20.8
14	Unhealthy food consumption	6-23	247	48.8
15	Zero Vegetables or Fruit Consumption	6-23	302	59.6
16	Bottle Feeding	0-23	93	21.7

ANTHROPOMETRIC STATUS OF THE UNDER-TWO CHILDREN

The median weight of the children was 10.9g, the median height was 76cm, median mid-upper arm circumference was 13.0cm, median head circumference was 44.0cm. 3.5% were severely wasted, 2.8% were moderately wasted and 14.6% were overweight. Also, 7.6% were severely stunted, 46.9% were moderately stunted and 6.3% were too tall for their height. Furthermore, 19.7% were severely underweight, 11.9% were moderately underweight and 3.9% had too much weight for their age.

RELATIONSHIP BETWEEN INFANTS AND YOUNG CHILD FEEDING INDICATORS AND ANTHROPOMETRIC STATUS

There is significant relationship between exclusive breastfeeding and wasting ($p=0.01$), stunting ($p=0.00$) and underweight ($p=0.00$). Also, there is significant relationship between breastfeeding within the first two-days of birth and stunting ($p=0.00$), as well as breastfeeding within the first two-days of birth and underweight ($p=0.00$). Furthermore, there is significant relationship between bottle feeding and stunting ($p=0.04$), as well as bottle feeding and underweight ($p=0.01$).

CONCLUSION AND RECOMMENDATION

The prevalence of exclusive breastfeeding, early initiation of breastfeeding and continued breastfeeding in the second year were low. Also, minimum dietary diversity, meal frequency, milk feeding frequency and acceptable diet were not achieved by most of the under-two children with most children. Consuming unhealthy food and zero vegetable/fruit consumption. In addition, double burden of malnutrition was observed among the under-two children. Hence, the need for intervention targeted at improving the infant and young child feeding practices to improve nutritional status.

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Household Food Access and Coping Strategies Adopted During Covid-19 Pandemic Lockdown Among People Residing In Odeda Local Government Area Of Ogun State, Nigeria.

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KEYWORDS: Food Insecurity, Coping strategies, COVID-19, Nutritional status.

BACKGROUND AND OBJECTIVES:

Novel coronavirus (COVID-19) emerged in December 2019 in the city of Wuhan, China causing severe respiratory infections and resulting in millions of admissions to hospital and over a million deaths worldwide. Authorities imposed protective measures including confinement to flatten curves which made it very difficult for the citizens to have sufficient food to sustain themselves [1]. This study assessed household's food accessibility and coping strategies adopted during COVID-19 pandemic lockdown in Odeda Local Government Area of Ogun State.

METHODS: The study was cross-sectional design and 300 households (mothers and index child) were randomly selected in the Local Government. Data such as socio-demographic, household food insecurity status, and coping strategies were obtained using a semi-structured questionnaire, Household food insecurity experience scale [2], and coping strategies index scale questionnaire [3]. Data were analysed and presented using descriptive and inferential statistics. Data was significant at P-value ≤ 0.05 .

RESULTS AND DISCUSSION: The age of the respondents was between 20-59 years and 60.3% were traders. Food security status showed that 15.7%, 50%, 14.3% and 20.0% of the respondents were food secure, severely, mildly, and moderately food insecure respectively. The major coping strategies adopted were relied on less preferred and less expensive foods (35%), limited portion size at mealtimes (31.3%), and reduced number of meals eaten in a day (34.3%). The result on the major coping strategies adopted by all the respondents to mitigate the stress and shock of food insecurity during COVID-19 pandemic lockdown was similar to the study of [4, 5] where relied on less preferred and cheaper food was ranked first among the coping strategies.

A significant association exists between Coping Strategy categories and food security status ($P = 0.00$). The result on the nutritional status of the respondents revealed that 51.3%, 11.3%, 25.3%, 12%, 59.7%, 14.3% and 32.4% had normal BMI, underweight, overweight, obese, stunted, wasted, and underweight respectively.

CONCLUSION: The prevalence of food insecurity was high and most households adopted coping strategies that leads to higher levels of food insecurity.

RECOMMENDATIONS: Nutritious or beneficial coping strategies that will assist household to maintain their nutritional status should be developed for cases of emergency. Also, house gardens should be encouraged so that households can access food stuff when their access to the market is/are limited.

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OA3

Effect of Counseling and Text Message Reminders on the Uptake and Adherence of Iron and Folic Acid Supplements Among Pregnant Women Attending Antenatal Clinic in Gwagwalada, Abuja.

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KEYWORDS: Adherence, Iron-folic Acid, Counseling, Text Message Reminders.

BACKGROUND AND OBJECTIVES:

Poor compliance is a significant cause of low Iron-Folic Acid Supplementation uptake and adherence. Therefore, there is an urgent need to address these factors affecting compliance and develop innovative strategies to mitigate them. The study aimed to assess how Iron-Folic Acid counselling and Text message reminders could improve the uptake and adherence of Iron and Folic Acid Supplements among pregnant women attending antenatal clinics.

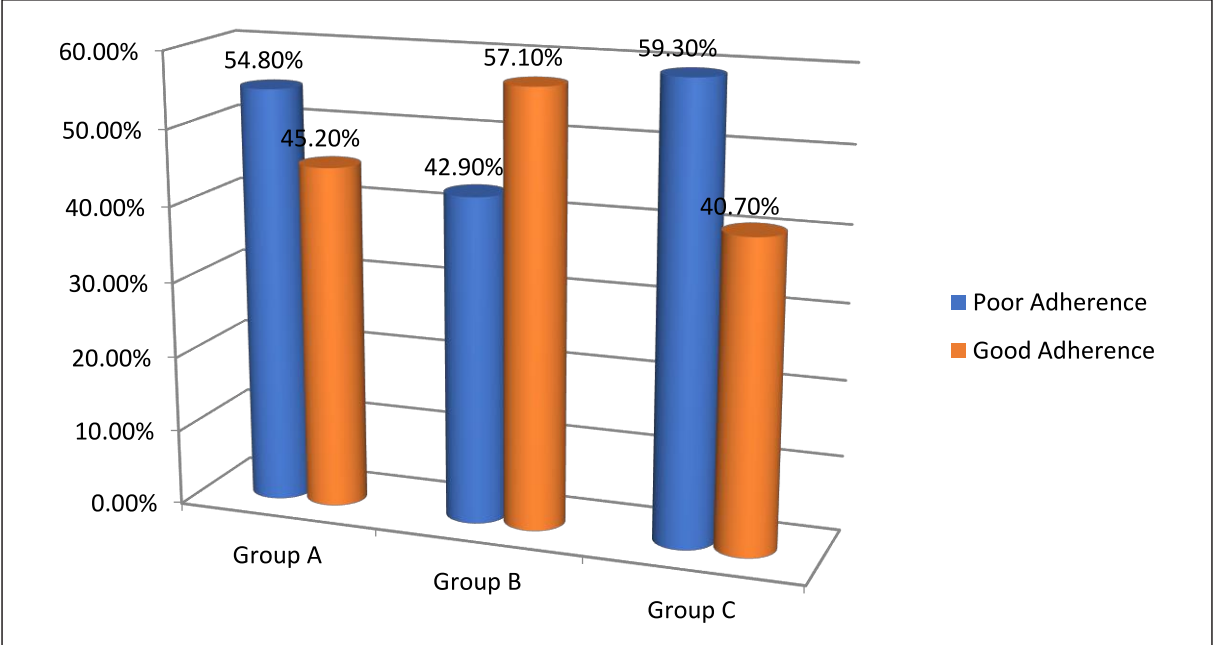
METHODS: This study used a type-2 effectiveness implementation hybrid design with a quasi-experimental technique. Respondents who met the selection criteria and gave consent were purposively selected into the various study groups. A total of 153 respondents were recruited into the study groups, counselling alone (Group A), counselling and text message reminder (Group B), control (Group C), each having 51 respondents, and 4 health care practitioners involved in antenatal clinic counselling at the intervention health facility. Parametric and nonparametric analyses were utilized to evaluate survey results across the two intervention groups while controlling for various demographic and socioeconomic variables, including the health facilities used.

RESULTS AND DISCUSSION: The perceived acceptability, appropriateness and feasibility of the counselling intervention from the perspective of respondents in group A was 100%, 99%, and 94%, respectively, while that of group B that received the counselling and text message reminder intervention was 97%, 96%, and 96% respectively. The perceived acceptability, appropriateness, and feasibility of the intervention strategies deployed from the perspective of the HCPs were 62%, 75%, and 50%, respectively.

Self-report adherence to IFAS was 71.96 ± 13.62 in group B, 68.02 ± 11.56 in group A, and 65.19 ± 11.84 in group C. Analysis of variance showed no significant difference in the mean score, but post-hoc test showed a significant difference in the mean score of respondents in group B and C ($p=0.036$). Folic acid pill count adherence was 91.62 ± 7.98 in group B, 89.61 ± 8.62 in group C, and 88.57 ± 14.10 in group A. Analysis of variance in mean score showed that the difference between the groups ($p>0.05$) was not statistically significant. Iron supplement pill count adherence was 91.29 ± 8.03 in group B, 89.36 ± 8.86 in group C and 88.55 ± 14.00 in group A. The difference in pill count adherence mean score was not statistically significant between and within the group ($p>0.05$). Respondents in group A were 2.56 times more likely to have poor folic acid pill count adherence when compared to group B, respondents in group A were 3.96 times more likely to have poor Iron pill count adherence when compared to group B, respondents in group A were 1.62 times more likely to have poor self-report adherence when compared to group B.

CONCLUSION: The synergy of counseling and text message reminder is an effective strategy for improving the uptake and adherence of Iron and Folic Acid supplements among pregnant women attending antenatal clinics.

Figure 1: IFAS Self-report adherence among study Groups



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Anthropometric and iron status of primary school children (6-12 years) in Obollo-Afor, Udenu local government area of Enugu state, Nigeria

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KEYWORDS: Anthropometry, Iron status, School Children, Serum ferritin

BACKGROUND AND OBJECTIVES:

Iron Deficiency Anemia (IDA) is a global public health problem that affects 1.62 billion people causing detrimental effects on physical growth which is attributed to poor diets (1), with the highest prevalence in preschool children (47%) especially in developing countries (2). The study was carried out to assess the anthropometric and iron status of primary school children (6-12 years) in Obollo-Afor, Udenu Local Government Area (L.G.A.) of Enugu state, Nigeria.

MATERIALS AND METHODS: A cross-sectional study in which 300 school-aged children (6-12 years) in Obollo-Afor community in Udenu L.G.A. of Enugu state, Nigeria, constituted the sample size. Multi-stage sampling technique was employed in selecting respondents for the study. Structured and validated questionnaire was used for data collection. Anthropometric and biochemical measurements were assessed using standard procedures. Data were analysed using IBM SPSS for windows version 22. Data were presented as frequencies, percentages, means and standard deviation. T-test was used to determine relationship existing between means of variables while Chi-square was used to analyze relationship among variables. Significance was accepted at $P < 0.05$.

RESULTS AND DISCUSSION: Prevalence of severe, moderate and mild stunting were 1.7%, 9.0% and 12.0%, respectively. Thinness had 8.7% and 12.7% prevalence for severe and moderate thinness, respectively. Severe malnutrition was more among the females (17.8%) than males (11.9%) whereas moderate malnutrition was more among the males (21.0%) than females (17.8%). Weight-for-age of the males differed significantly ($p < 0.05$) from females with more males (10.1%) being moderately underweight than females (4.7%). Iron deficiency existed in 43.6% of the respondents. Prevalence of moderate and mild anaemia were 15.4% and 46.1%. CRP of the respondents revealed that more males (42.1%) than females (30.0%) had high risk of infection.

Source: serum ferritin (WHO, 2011); haemoglobin (WHO/UNICEF/UNU, 2001); creatine reactive protein (WHO, 2014)

CONCLUSION AND RECOMMENDATION: Malnutrition in the form of stunting, underweight and thinness, anaemia were seen among the school children. The need for a holistic approach in the management of malnutrition in Obollo-Afor is imminent.

Table 1 : Anthropometric indices of the respondents according to sex

Variables	Male F (%)	Female F(%)	Total F(%)	X ² ;df; p-value
Height-for-age				
Severely stunted (-3SD)	0(0.0)	5(1.7)	5(1.7)	5.413;3; 0.144
Moderately stunted (-2SD)	13(9.1)	14(8.9)	27(9.0)	
Mildly stunted (-1SD)	15(10.5)	21(13.4)	36(12.0)	
Normal (> -1SD)	115(80.4)	117(74.5)	232(77.3)	
Total	143(100.0)	157(100.0)	300(100.0)	
Weight-for-age (for 6-10 years)				
Severely underweight (-3SD)	0(0.0)	1(1.2)	1(0.6)	8.483;3; 0.037*
Moderately underweight (-2SD)	4(10.1)	4(4.7)	13(7.5)	
Normal (-1SD to +1SD)	30(33.7)	45(52.9)	75(43.1)	
Overweight (> +1SD)	50(56.2)	35(41.2)	85(48.9)	
Total	89(100.0)	85(100.0)	174(100.0)	
BMI-for-age				
Severely thin (-3SD)	12(8.4)	14(8.9)	26(8.7)	10.960;4;0.027*
Moderately thin (-2SD)	18(12.6)	20(12.7)	38(12.7)	
Normal (-1SD to +1SD)	100(69.9)	98(62.4)	198(66.0)	
Overweight (+2SD)	12(8.4)	11(7.0)	23(7.7)	
Obese (> +3SD)	1(0.7)	14(8.9)	15(5.0)	
Total	143(100.0)	157(100.0)	300(100.0)	

Table 2: Biochemical parameters of the respondents with sex

Variables	Male F(%)	Female F(%)	Total F(%)	X² ;df; p-value
Serum ferritin				
Iron deficient	8(42.1)	9(45.0)	17(43.6)	0.033;1; 0.855
Normal	11(57.9)	11(55.0)	22(56.4)	
Total	19(100.0)	20(100.0)	39(100.0)	
Haemoglobin				
Moderate anaemia	2(10.5)	4(20.0)	6(15.4)	3.199; 2; 0.202
Mild anaemia	7(36.8)	11(55.0)	18(46.1)	
Normal	10(52.6)	5(25.0)	15(38.5)	
Total	19(100.0)	20(100.0)	39(100.0)	
Creatine reactive protein (CRP)				
Low risk of infection	9(47.4)	4(20.0)	13(33.3)	7.521;2;0.023*
Mild risk of infection	2(10.5)	10(50.0)	12(30.8)	
High risk of infection	8(42.1)	6(30.0)	14(35.9)	
Total	19(100.0)	20(100.0)	39(100.0)	

Source: serum ferritin(WHO, 2011); haemoglobin (WHO/UNICEF/UNU, 2001); creatine reactive protein (WHO, 2014)

CONCLUSION AND RECOMMENDATION: Malnutrition in the form of stunting, underweight and thinness, anaemia were seen among the school children. The need for a holistic approach in the management of malnutrition in Obollo-Afor is imminent.

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Prevalence of Under-nutrition among Children (0-23 months) in Internally-Displaced-Persons Camps of Abuja, Nigeria

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KEYWORDS: Malnutrition; Children; Internally-Displaced-Persons

BACKGROUND AND OBJECTIVES

Malnutrition remains a problem of public health importance and a major cause of childhood mortality [1]. Internally-displaced-persons (IDPs) are challenged with food insecurity and instability which subsequently leads to malnutrition especially among women and under-five children. Hence, the study was aimed at assessing the nutritional status among children (0-23 months) in the IDP camps, FCT-Abuja, Nigeria; which could be used for planning and/or improving appropriate nutrition interventions.

MATERIALS AND METHOD: The study was a cross-sectional descriptive survey that involved 180 caregiver-child pair. Socio-demographic characteristics of the caregivers were obtained using pre-tested questionnaires while anthropometric parameters were assessed among the children using standard procedures.

RESULTS AND DISCUSSION: The study revealed that most of the caregivers (51.1%) are mothers while 64.4% were unmarried (Table 1). Marital status is known to influence the quality of care given to children because both the parents can contribute to the care of children by providing basic needs, psychological support and general welfare [2]. The results indicated that 74.3%, 68.7% and 44.8% of the children in the IDP camps were wasted, underweight and stunted respectively (Figure 1a). Based on mid-upper-arm-circumference measurements, 82% of the children were acutely malnourished, 62% had severe acute malnutrition while 20% had moderate acute malnutrition (Figure 1b). The prevalence of malnutrition using the common nutritional indices among the children were higher compared to reports from the national surveys of health and nutrition [3,4]. The result implies that there exist both acute and chronic malnutrition among the children.

Table 1: Socio-demographic characteristics of caregivers of children (0-23 months) in IDP camps, FCT Abuja

Characteristics	Frequency (n=180)	Percentage (%)	Characteristics	Frequency (n=180)	Percentage (%)
Caregivers			Marital Status		
Mother	92	51.1	Married	64	35.6
Father	14	7.8	Single	46	25.6
Grandmother	23	12.8	Divorced	4	2.2
Aunt	25	13.9	Separated	26	14.4
Relatives	26	14.4	Widowed	38	21.1
			Declined	2	1.1

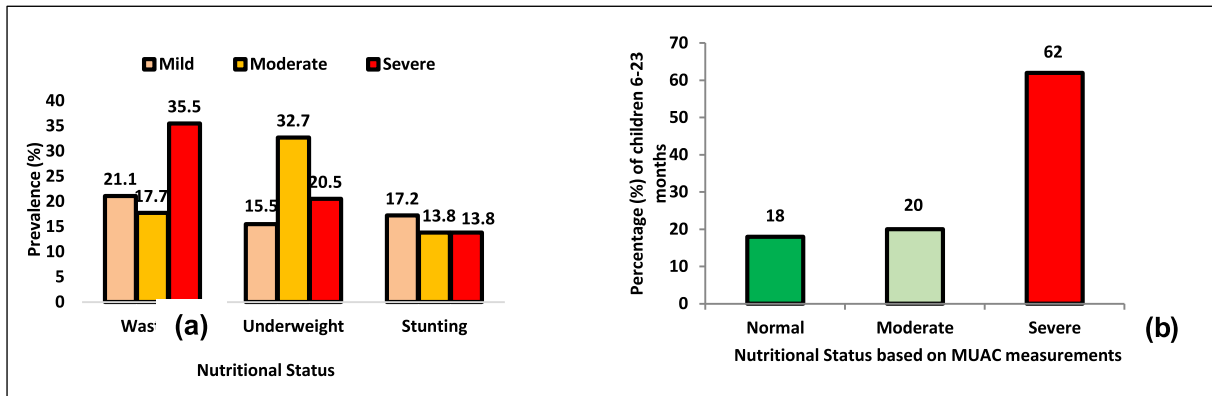


Figure 1: (a) Nutritional status of children (0-23 months) in IDP camps, FCT Abuja. **(b)** Prevalence of malnutrition (based on MUAC measurements) among children (6-23 months) in IDP camps.

Values are expressed as percentages (%) of children (0-23 months), n = 180. Nutritional status indices were classified as severely malnourished = < - 3SD; moderately malnourished = < -2SD to ≥ - 3SD; mildly malnourished = < -1SD to ≥ -2SD; Normal = ≥ -1SD [15]. Children with MUAC measurements: (< 11.50 cm = Severe acute malnutrition); (11.50 cm – 12.49 cm = Moderate acute malnutrition); (12.50 cm and above = Normal)

CONCLUSION AND RECOMMENDATION: In conclusion, there was high prevalence of under-nutrition among children in the IDP-camps, Abuja. There is urgent need for relevant stakeholders to come to the aid of the IDPs and their children to improve their nutrition and overall well-being.

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Consequences of malaria infection on the nutritional status of school children in Ogun State, Nigeria

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KEYWORDS:

BACKGROUND AND OBJECTIVES

Malaria is one of the most severe public health problems worldwide (6). This study assessed the anthropometric indices and rate of malaria infection among school age children in Ogun State, Nigeria.

MATERIALS AND METHOD: A total of one thousand one hundred and thirty-two school-age children from the three senatorial districts in Ogun State were selected using systematic and simple random sampling method. A structured questionnaire was used to obtain information on socio-economic characteristics; water, sanitation, and hygiene (WASH) among the respondents. Anthropometric measurements (5) were taken, and blood samples from 30% of total sample of the children were screened for malaria parasites using standard procedures (4). Frequency counts, percentages, means, standard deviations, correlation, and the T-test were used to analyze the data.

RESULTS AND DISCUSSION: Results showed that 36.5% of the respondent families earned less than two hundred thousand naira annually. Also, 43.0% and 62.0% of the mothers had secondary and tertiary education, respectively. WASH practices showed that 55.6% used dirty water for washing their hands. The mean weight, height, and mid-upper arm circumference of the children were 25.8kg, 1.30m, and 187.29cm, respectively. The prevalence of wasting, stunting, underweight, and overweight were 2.7, 20.6, 18.5, and 6.1%, respectively. It showed that 20.5% and 28.5% of the children had high levels of malaria parasites in urban and rural LGAs respectively, while 25.2% (boys) and 23.6% (girls) also had a high level of malaria parasites in the selected LGAs with significant gender (0.153) and sector (0.030) differences. Correlation revealed a significant relationship between malaria (+ve) and stunting ($r = 0.207$), wasting ($r = 0.113$) and underweight ($r = 0.210$). Stunting was significantly related to household size ($r = 0.121$), family income ($r = 0.115$) and mothers' education ($r = 0.203$).

The relatively high prevalence of undernutrition observed among schoolchildren in this study may be due to the fact that most of these children are from parents of low socio-economic background, who themselves lived in poor houses where unhygienic living standards, unsafe drinking water, and insanitary conditions of the immediate environment prevail. Such environmental factors contribute to the survival of disease agents such as parasites, bacteria, and viruses. The prevalence of malaria parasitaemia reported in the study was high (56.5%), other authors have also reported the same percentage of overall malaria prevalence to be 43.1% during the follow-up study conducted by Alexandre *et al.* (2) among the children, which is higher than

the 27% prevalence of malaria parasite reported by Ademowo (1) among school children from a rural village in western Nigeria and the study of Maketa, which reported the prevalence of malaria to be 30.9% and 14.3% in Cite Pumbu and Kindele health areas, respectively (3).

CONCLUSION AND RECOMMENDATION: This study concluded that a significant relationship exists between socio-economic status, nutritional status, and the rate of malaria infection in children. Hence, the study recommended a national policy for improved sanitation, raising awareness of the importance of malaria and other infections in school-age children, and improving the use of established control measures such as ITNs in this age group.

keywords: Stunting, malaria, sanitation, hygiene, anthropometry

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OA7

Assessment of Dietary Diversity and Nutritional Status of Pregnant Women Attending Ante-Natal Clinic at University College Hospital, Ibadan

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KEYWORDS: Dietary diversity, Pregnant women, Nutritional status

BACKGROUND AND OBJECTIVES

Dietary diversity is an aspect of dietary quality that indicates general nutritional adequacy. Lack of diversified diets is a severe problem in the developing world, where diets are predominantly starchy staples with few animal products, seasonal fruits and vegetables (1). The nutritional status of a woman during pregnancy is important as a suboptimal diet impacts negatively on the health of the mother, the foetus and the newborn

(2). The study aimed to assess the dietary diversity, the nutritional status and factors influencing the two among pregnant women.

MATERIALS AND METHODS

A cross sectional analytical design was used and the study was carried out in the Antenatal Clinic of the University College Hospital, Ibadan. A sample size of 150 pregnant women was used with the first respondent being randomly selected and thereafter systematic sampling was used until the required sample was reached. Mid upper arm circumference (MUAC) of the left arm of the respondents was measured to determine the nutritional status. A structured interviewer administered questionnaire was used to obtain information on socio-demographic & economic characteristics of the respondents, obstetric & other maternal history, 24-hour dietary recall, dietary diversity, meal intake and anthropometry. Dietary diversity scores (DDS) was classified as ≤ 3 food-groups =Low DDS; 4-5 food-groups =medium DDS; ≥ 6 food-groups =high DDS.

Data were entered and analyzed using SPSS version 26 and summarized using descriptive statistics such as frequencies, means and percentages. A P-value of < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Results showed that 49.3% of the respondents were within the 26-35 age group. The mean dietary diversity score (DDS) was 9.5 with 92.7% having high dietary diversity, as shown in Table 1. Significant determinants of dietary diversity in this study were educational level of the pregnant women, family income, and nutritional knowledge. Regarding nutritional status, 97.3% of the respondents were normal (MUAC > 21.0 cm) while 2.7% were malnourished (MUAC < 21.0 cm). Family type, monthly income, occupation of respondent, and parity were significant predictors of the nutritional status of the pregnant women.

Table 1: Dietary Diversity of Respondents

DDS category	Frequency	Percentage (%)
Low	4	2.6
Medium	7	4.7
High	139	92.7
Total	150	100

CONCLUSION AND RECOMMENDATION

The study concluded that demographic, and socio economic factors influence dietary diversity and nutritional status of pregnant women. It is recommended that nutrition education on the importance of diversified diet should be further enhanced as a strategy to improve nutrient intake, and nutritional status among pregnant women.

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Breastfeeding status and prevalence of underweight among infants of HIV-infected mothers at Federal Medical Centre, Owerri, Imo State, Nigeria

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KEYWORDS: Human Immuno Virus (HIV); Underweight; Breastfeeding; Children

BACKGROUND AND OBJECTIVES

Children of HIV-Infected mothers are susceptible to undernutrition and poor growth. Malnutrition and HIV infection are complex medical conditions that causes high morbidity and mortality in children. There are limited studies on the nutritional status of children and breastfeeding practices among HIV-Infected women in Nigeria. The study assessed the breastfeeding status and prevalence of underweight among infants of HIV-infected mothers at Federal Medical Centre, Owerri, Imo State, Nigeria. Assess the proportion of infants who were breastfed; and proportion of the children who were underweight.

MATERIALS AND METHOD:

The study employed a cross sectional study design. A total of 249 HIV-Infected mother and their infants (0-12 months) pairs who receives treatments at Federal Medical Centre, Owerri were randomly selected for the study. Ethical approval for the study was obtained from Ethical Committee unit of Federal Medical Centre, Owerri. Data were collected from the hospital records of mother and child pairs that visited the heart-to-heart clinic from January 2019 to February 2021 and a structured questionnaire administered to mothers to elicit information from their infants. The weight of the children was taken using standard procedure and analyzed using WHO Anthro v3.2.2. Statistical analysis was carried out using student t-test, chi-square test and Pearson correlation test for association analysis of variables. Statistical significant was accepted at $p < 0.05$.

RESULTS AND DISCUSSION:

A total of 249 infants with the mean age of 8.7 ± 6.2 weeks for Male while 9.5 ± 7.4 weeks for female; about 44.8% were male children while 55.2% were female. Male children had a mean weight of 3.50 ± 1.31 kg while female children had 3.41 ± 0.84 kg. This study shows that about 82.3% of children born by mothers living with HIV were breastfed. There was no significant ($\chi^2 = 0.291$; $p = 0.589$) relationship between breastfeeding and the sex of the children. About 4 out of every 5 children aged 0 to 12 months of mothers living with HIV were underweight with about 56.1% severely underweight (63.2% male and 50.4% female); 22.2% were moderately underweight (21.7% male and 22.6% female). High prevalence of underweight observed in this study could be associated to adverse pregnancy outcomes such as low birth weight (LBW) and preterm delivery (PTD) common among HIV infected women [1], and Children of HIV-Infected women are at risk of deficiencies of multiple micronutrients important in child development and growth. There was no significant ($\chi^2 = 7.619$; $p = 0.055$) relationship between weight-for-age status and the sex of the children. The complex medical condition that carries significant morbidity and mortality cases on children could be as a result of malnutrition and HIV-infection [2]. There was a significant, positive and weak correlation coefficient ($r = 0.393$; $p < 0.001$) between Age of the children in weeks and the weight of the children in kilogram, There was a significant, positive and weak correlation coefficient ($r = 0.136$; $p < 0.035$) between sex of the children and their weight for age

status. There was a significant, positive and strong correlation coefficient between weight of the children, weight for age z-score ($r = 0.758$; $p < 0.001$) and weight for age status ($r = 0.710$; $p < 0.001$). There was no significant correlation between weight of the child and sex ($r = -0.043$; $p = 0.509$) and breastfeeding ($r = 0.072$; $p = 0.270$).

Table 1: Correlation between age, sex, weight, breastfeeding, weight for age z-score and weight for age status of infants of HIV-Infected mothers.

Variables		Age of child (weeks)	Sex of child	Breastfeed ing	Weight for age z-score	Weight for age Status
Age of child (weeks)	r-value	1	.061	.095	-.226**	-.046
	p-value		.329	.134	.000	.482
	N	259	259	249	239	239
Weight of child (kg)	r-value	.393**	-.043	.072	.758**	.710**
	p-value	.000	.509	.270	.000	.000
	N	239	239	237	239	239

Table 2: Percentage distribution of breastfeeding and weight-for-age status of infants of HIV-Infected mothers based on their sex

Variables	Male n (%)	Female n (%)	Total n (%)	X ² -value	p-value
Breastfeeding					
Yes	93 (83.8%)	112 (81.2%)	205 (82.3%)	0.291	0.589
No	18 (16.2%)	26 (18.8%)	44 (17.7%)		
Weight-for-age status					
Severe underweight	67 (63.2%)	67 (50.4%)	134 (56.1%)	7.619	0.055
Moderate underweight	23 (21.7%)	30 (22.6%)	53 (22.2%)		
Normal weight for age	15 (14.2%)	36 (27.1%)	51 (21.3%)		
Severe Overweight	1 (0.9%)	0 (0.0%)	1 (0.4%)		

CONCLUSION AND RECOMMENDATION(S):

The study shows that 4 out of 5 children of HIV-infected mothers are underweight and most of the children received breastfeeding. Intervention should be focused on improved nutrition and health care development of undernourished children of HIV-Infected women in Nigeria.

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Impact of School feeding program on the anthropometric indices of preschool children in Oweri West Local Government Area, Imo State

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KEYWORDS: Wasting, Underweight, Preschool Children, School Lunch Programme, Anthropometric,

BACKGROUND AND OBJECTIVES

Problem of malnutrition among school children is still growing and the extent is not known. To bridge the malnutrition gap, sustainable nutrition action must be taken to provide adequate nutrition for proper growth, cognitive and intellectual development of the child.

School feeding programs is practiced in both developed and developing countries of the world to enhance academic performance of pupils (1). In Nigeria, School Feeding Program (SFP) is aimed at increasing school enrolment as well as improving academic performance of school children. Anthropometric indices are commonly used to assess nutritional status, health, and development of children and the wider population (2). Thus, this study assessed the effect of SFP on the Anthropometric indices of preschool children in Owerri West L.G.A, Imo State.

MATERIALS AND METHODS: A case-control study comprising of 400 preschools (2-5yrs) were drawn from 44 government-owned primary schools enrolled for SFP and those not enrolled for SFP in Owerri west Local Government Area, Imo State Nigeria. Sample size was determined using the method of Taro-Yaname (3), schools were selected based on purposive sampling, simple random sampling technique was used to select 200 preschool from different schools. Method described by Okafor (4) was adopted to ensure proportional sampling. Children participation was based on parents consent. Daily lunch served to preschools in the control group was obtained from parents and/or caregivers on special arrangement, lunch of test group was collected from school cooks. Nutrient composition of food samples were chemically analyzed following standard methods. Children were served same type and portion (300g) of food. Raw data generated from the study were summarized in excel spread sheet, preschools malnutrition (weight-for-age and weight-for-height) status obtain using WHO Antro Software Analyzer. Student T-test was used to compare the nutrient composition of food samples.

RESULTS AND DISCUSSION: Male and female preschool children (2-5yr) in nursery section and primary one constituted the test and control groups. Result revealed that 22.5% underweight and 30% wasting found among the preschool before the study reduced to 11.5% and 14% (test group); 39% to 25.5% (underweight) and 41.5% to 39% (wasting) for the control group. Generally, malnutrition was found to be higher in girls than boys. This finding compares favorably with the finding of (5) in a study conducted in Anambra State, Nigeria. Protein, calcium, iron, zinc and pro-vit., A composition of SFP was significantly ($p < 0.05$) higher. Under-five children (test and control) received high calorie meals, and improved protein meals for preschool in SFP.

RESULT

Table 1. Prevalence of malnutrition among preschools before and after the study

Malnutrition Status		Test group		Control group	
		Male n (%)	Female n (%)	Male n (%)	Female n (%)
Weight-for-age (<-2SD WHO Ref)	Base-line	20(10)	25(12.5)	38(19)	40(20)
	End-line	10(5)	13(6.5)	35(17.5)	36 (8)
Underweight	% Reduction	10(50)	12(48)	3 (7.8)	4(10)
Weight-for-height (<-2SD WHO Ref)	Base-line	28(14)	32(16)	40(20)	43(21.5)
	End-line	12(6)	16(8)	38(19)	40(20)
Wasting	% Reduction	16(57)	16(50)	2(5)	3(6.9)

Table 2: Mean Nutrient Compositions of School Lunch for the pre-school children

Food Nutrient	SFP			Non SFP			t-ratio	p-value (p<0.05)
	n	\bar{X}	SD	n	\bar{X}	SD		
Energy Kcal	200	1804±352		200	2058±392		-14.26	<0.001
KJ		427±84.22			488±94.07		-64.69	<0.001
Protein (g)	200	14.71±6.50		200	6.51±1.66		40.71	<0.001
Fat (g)	200	9.76±6.69		200	13.38±4.72		-15.19	<0.001
Calcium(mg)	200	78.59±18.58		200	72.22±13.50		15.88	<0.001
Iron (mg)	200	2.86±1.24		200	1.51±0.81		13.37	<0.001
Zinc (mg)	200	5.39±3.63		200	3.72±3.28		9.00	<0.001
Pro-Vitamin A(mg)	200	473.30±680.62		200	299.38±437.31		73.65	<0.001
Vitamin C(mg)	200	25.56±41.92		200	33.25±32.18		-12.65	<0.001

CONCLUSION AND RECOMMENDATION

School lunch positively affected the anthropometric indices of the preschools studied (test and control groups), though lunch for preschools in the school feeding program contain higher protein, iron, calcium, zinc and pro-vitamin A. The government is advised to extend the SFP to more schools in the state for improved academic performance and nutritional status of preschools.

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Effect of Feeding Simulators on Intake of Complementary Foods among Infants Age Six Months to Two Years in Oluyole Local Government Area, Oyo State, Nigeria

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KEYWORDS: Infants, Feeding Simulators, Complementary Food, Adequate Nutrition.

BACKGROUND AND OBJECTIVES

To ensure that infant gets adequate nutrition, it's essential to assist the child to eat in a responsive-feeding environment rather than forced-feeding.^[1] A lot of infant's parents are disturbed about difficulties encountered during feeding; however, care givers play an important role in how the child will learn to feed especially through the strategies used to stimulate feeding^[2]. The practice of forced-feeding is usually borne out of good intentions for the Child's benefit. However because it is usually with the use of coercion, force, physical restraints or psychological threat, it has been regarded as a form of inhumane and degrading treatment that could lead to unhealthy food habits and other health related consequences.^[1] The study evaluates the effects of feeding-stimulators on intake of complementary-food among infants aged six months to two years.

MATERIALS AND METHODS: The cross sectional and experimental design involved nursing mothers with infant aged 6-24 months in Oluyole Local Government with total number of four hundred respondents selected for the base line survey using two- stage sampling technique from eight primary health centers out of which ninety respondents were selected for intervention amongst infants with feeding difficulties. Each randomly selected nursing mothers were administered a structured questionnaire and their infants' anthropometry measures recorded. Data was analyzed using SPSS for descriptive and inferential statistics at $P < 0.05$.

RESULTS AND DISCUSSION: Based on the result from the baseline survey, 30% of nursing mothers reported challenges of infants rejecting complementary-food from which 7.8% applied force-feeding. The intervention on the use of FS showed that 70% of respondents' had improved rate of child feeding and reduced force-feeding. There was a significant difference in the food intake of infants with FS and infants without FS; also a significant improvement in anthropometric measurement among the infants after the intervention this corresponds to previous studies that stimulation consistently benefit child development, and nutrition usually improves nutritional status and growth, and sometimes improves child development³

CONCLUSION AND RECOMMENDATION:

Most of the infants take more food when they were been stimulated with songs; either verbally or rhymes from phone and use of toys especially toys that gave sounds. Nursing mothers should be encouraged to patiently make use of feeding simulators in place of force feeding. In addition, there is need for awareness and sensitization on various media and at post natal clinics to educate nursing mothers on the proper use of feeding simulators.

Table 1: T-test Showing the Significant Difference between Food Intake among Infants without Feeding Stimulators and Infants That Used Feeding Stimulators

Variables	Mean	Std. dev	Std. Error Mean	95% Confidence interval of the difference		t	Df	Sig. (2- tailed)
				Lower	Upper			
Food intake between infants without feeding stimulators and infants that used feeding stimulators	.225	.577	.091	.041	.409	2.467	89	.018*

Significant at p<0.05

Table 2: T-test Showing Significance Difference between Weights of Infants with FS

	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	Df	Sig (2 tailed)
				Lower	Upper			
Weight Before –				-	-			
Weight After	-1.01400	.81037	.11460	-1.24430	.78370	8.848	89	.000

Significant at p<0.05

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Nutrient Adequacy and Nutritional status of School Adolescents in Abeokuta, Ogun state.

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KEYWORDS: Nutritional status, Nutrient Adequacy, Adolescents, Abeokuta.

BACKGROUND AND OBJECTIVES

Adolescent malnutrition is still prevalent worldwide especially in the developing countries (1). Nutritional deficiencies and inadequacies are major healthcare problem and one of the global health issues accounting for 7% of the global disease burden (2).

Objective: The study assessed the nutrients adequacy and nutritional status of school adolescents in Abeokuta, Ogun state.

MATERIALS AND METHOD:

The study design was cross-sectional and descriptive. Multistage sampling techniques was used for the selection of 200 respondents from public secondary schools in Abeokuta North and South. Data were obtained on socio-demographic, socioeconomic characteristics, nutrients intake and anthropometry of the respondents using a structured self-administered pre-tested questionnaire, repeated 24-hour dietary recall (3) and standard procedures (4). Anthropometry and Dietary data were analyzed using WHO AnthroPlus software and NutriSurvey software and results were presented using descriptive and inferential statistics.

RESULTS AND DISCUSSION: The mean age of the respondents was 16 ± 2.38 years. Majority (71.0%) of the respondents lived with their parents, and 42% of the respondent consumed their breakfast in school. The nutritional status result revealed that 2.0% and 4.5% were severely stunted and thin, respectively, and nutrient adequacy revealed excessive intake of energy, carbohydrates, and Protein and inadequacies of vitamins and minerals, which agreed with the result reported by (5), where micronutrient inadequacies were reported among adolescents. However, this result was obtained from a study that assessed school adolescents in Abeokuta, Ogun state; therefore, this result cannot be generalized.

CONCLUSION AND RECOMMENDATION:

Adolescent malnutrition remains a serious concern related to increased access to cheap food outlets selling mainly non-nutritious starchy foods and carbonated beverages, which are energy dense. Therefore, routine nutrition assessment and recognition of adolescent micronutrient deficiencies are necessary as a group of crucial public health issues.

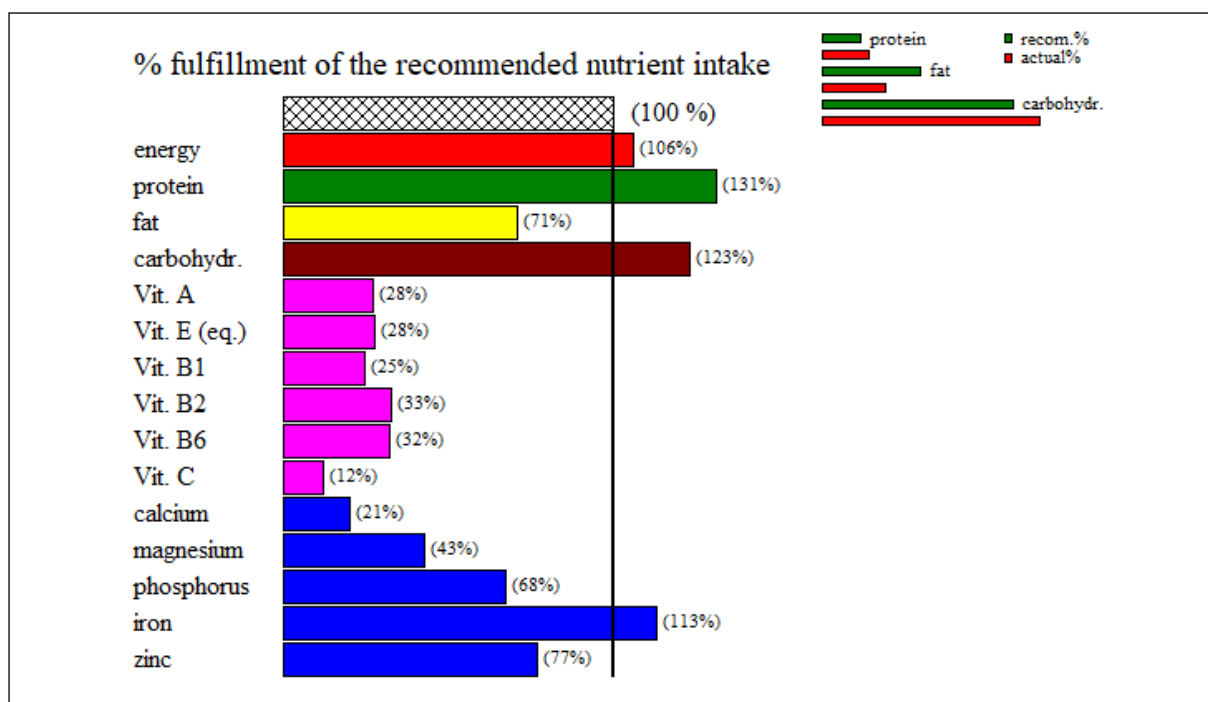


Figure 1: Respondents' percentage fulfilment of recommended nutrient intake

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Antinutritional factors and Amino acid profile of complementary foods made from Malted Yellow Maize (*Zea Mays L.*) and Sprouted Cowpea (*Vigna Unguiculata*) Composite Flour

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KEYWORDS: Complementary food, Antinutritional factors, Amino acids, Malnutrition

BACKGROUND AND OBJECTIVES:

Nutrition during infancy and early childhood is fundamental to the full development of each child's human potential. Infants and young children are at increased risk of malnutrition from six months of age onwards when breast milk alone is no longer sufficient to meet their nutritional requirements hence appropriate complementary foods (CF) play a critical role in bridging these gaps.[1] The prevalence of child malnutrition in Nigeria is 37% stunting, 7% wasting, 22% underweight and 2% overweight.[2] Cereals and legumes are good sources of cheap, high-quality nutrients which complement to improve the protein content of food. A better knowledge of the antinutritional factors and amino acid profile of (CF) is essential to calculate the scores and, therefore to predict their protein quality.

MATERIALS AND METHODS: Yellow maize (*Zea mays L.*), Cowpea (*Vigna unguiculata*), Sweet potato (*Ipomea batata*) and dried fish (*Clupea herangus*) were purchased at Osiele market in Abeokuta, Ogun State. A simplex lattice design was adopted for two-component mixtures with constraints (MYM:60–100%, SB:0–40%) used to investigate flour mixtures of Malted Yellow Maize (MYM) and Sprouted Beans (SB) as independent variables, antinutrients and amino acids of these flour mixtures as dependent variables. Eight (8) formulations were generated, and porridges were prepared from the formulated (CF) samples, an equal proportion of sweet potato and fish flours (8.33g each) were added in the course to meet up with the minimum dietary diversity recommendation for infant and young child nutrition. This study determined the antinutrient content and amino acid profile using standard methods, and data were analyzed using mean, standard deviation, and percentages. Analysis of variance was used to test for significant difference between means, at ($P < 0.05$) and Duncan multiple range test used to separate means.

RESULTS AND DISCUSSION: The result shows the antinutrient content in the samples were generally low, the tannin content ranged from 34.31mg/100g (MYM100:SB0) to 42.25mg/100g (MYM90:SB10), Phytate 1.25mg/100g (MYM70:SB30) to 1.68mg/100g (MYM60:SB40), Oxalate 17.63mg/100g (MYM70:SB30) to 26.78mg/100g (MYM80:SB20), Trypsin inhibitor 6.50mg/100g (MYM80:SB20) to 14.14mg/100g (MYM60:SB40). Low antinutrients is attributed to processing and cooking.

Table 1: Amino acid score of complementary food made of malted yellow maize and sprouted beans composite flour.

MYM=Malted Yellow Maize, SB=Sprouted Beans, SAA=Sulfur Amino Acid, ArAA=Aromatic

The result further shows most amino acids met the recommendation, hence infants and young children

are still breastfeeding, both will complement each other.

CONCLUSION AND RECOMMENDATION:

The antinutrient contents of the (CF) were low compared to the parent materials. Optimization recommend (CF) (MYM100:SB0), (MYM60:SB40) for use.

Table 1: Amino acid score of complementary food made of malted yellow maize and sprouted beans composite flour.

Amino acids	Recommend ation(6 months-3 years)	MYM 100: SB0	MYM 100: SB0	MYM 60: SB40	MYM 80 :SB20	MYM 70: SB30	MYM 90: SB10	MYM 80: SB20	MYM SB
Leucine	66	34.85	34.85	37.42	30.30	29.85	30.91	30.30	37.42
Lysine	57	27.89	27.89	29.12	19.30	20.88	19.30	19.30	29.12
Isoleucine	32	42.19	42.19	48.12	35.00	32.25	35.00	35.00	48.12
Phenylalanine	52	25.96	25.96	30.96	20.38	20.96	21.92	20.38	30.96
Tryptophan	8.5	28.24	28.24	31.76	25.88	24.71	28.24	25.88	31.76
Valine	43	30.93	30.93	31.86	29.07	27.67	29.07	29.07	31.86
Methionine	52	11.15	11.15	12.31	10.19	10.00	10.58	10.19	12.31
Threonine	31	35.16	35.16	40.32	28.06	30.00	31.61	28.06	40.32
Histidine	20	37.50	37.50	40.50	28.00	32.00	31.50	28.00	40.50
SAA	27	30.04	30.04	34.81	28.52	27.78	29.63	28.52	34.81
ArAA	52	50.58	50.58	56.73	41.54	42.31	45.00	41.54	56.73

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PA13
A Study of The Lipid Profile and Oxidative Stress in Pregnancy

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KEYWORDS: Oxidative Stress, Pregnancy, Lipid Profile, Gestational-weight.

BACKGROUND AND OBJECTIVES:

Reactive oxygen species, at low concentration play important role in normal physiology. However, when their production exceeds the buffering capacity of the body's antioxidant defense system oxidative stress

arises. Pregnancy is accompanied by alteration in metabolism and physiology to meet the high energy and oxygen demands of the developing fetus. These alterations could lead to a disruption in the pro oxidant/antioxidants balance. However, there is a dearth of information on this on Nigerian women.

MATERIALS AND METHOD: Across section of 60 healthy normotensive women were selected for this study. 20 non pregnant women for the control group, 20 in their second trimester and 20 in their third trimester. The serum level soft otal cholesterol, triglyceride, LDL-cholesterol, HDL-cholesterol), were assessed in these women and the values compared across the gestation at large. These rum thiobarbituricacitre active substances (TBARS), a marker for lipid per oxidation and the serum free radical (DPPH) scavenging ability were used as markers of oxidative stress. The anthropometric data was also taken and the BMI were calculated.

RESULTS AND DISCUSSION: The result revealed an increase in the mean gestational weights and the BMI values with gestational age ($p>0.24$). The Waist-Hipratioals or ecorededan increase in the pregnant state which was significant in these condtrimester ($p<0.09$). The total-Cholesterol, Triglyceride,LDL-Cholesterol were all increased in the pregnant subjects ($p<0.0001$). However, there was a decline in the lipid profile parameters in the second trimester from the levels for these condtrimester except for HDL-Cholesterol which recorded a decline in the second trimester and a significant increase in the third trimester ($p<0.01$). The free radical (DPPH) scavenging capacity recorded an increase in the 2nd trimester ($p>0.78$) and a decline in the 3rd trimester ($p>0.95$); while level of peroxidation by TBARS levels also recorded a decline in the pregnant state. The increase in the BMI and body weight observed in normal pregnancy could play a role in the hyper lipidemia observed in the pregnant state. This increase in lipid profile parameters could account for increased lipoperoxidation, asevident in the observed rise in DPPH and TBARS in the second trimester. The decline in both DPPH scavenging ability and TBARS levels in the third semester is in line with the metabolic shift to reduced lipogenesis characterized by hard labor, even in pregnancy.

RESULTS

Table1: AnthropometricDimensionsandBloodPressurewithGeatationalAgeamongNigerianWomen

Gestational Age	S/No	Age (Yr)	Weight (kg)	Height (m)	BMI(k g/m ²)	Waist (cm)	Hip (cm)	Waist/Hip Ratio	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)	Sys /Diaratio
Control	Mean	22.2	64.07	2.11	23.82	76.27	95.47	0.80	122.0	77.7	1.58
	SD	2.54	13.31	2.60	4.818	9.878	10.86	0.08	11.4	9.07	0.12
2 nd Trimester	Mean	29.85	1.566	67.50	27.63	39.85	42.53	0.94	96.0	54.0	1.81
	SD	5.56	0.09	14.08	5.930	6.018	4.778	0.06	8.2	8.8	0.24
3 rd Trimester	Mean	29.25	1.59	76.95	30.73	43.88	44.88	0.98	101.0	59.0	1.72
	SD	3.63	0.07	16.17	6.736	7.427	6.99	0.10	12.0	10.0	0.18

CONCLUSION AND RECOMMENDATION:

Since weight gain is inevitable in pregnancy despite the association with increased oxidative stress, increased emphasis should be placed on the importance of anti-oxidant rich food sources. It should be noted that conventional physical exercise is not a regular feature of the daily activities among elite women in Nigerian. Although majority of Nigerian rural women are engaged in hard labor, the effect of such on their anti-oxidative status is yet to be studied.

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PA14

Diet quality and nutritional status of lactating mothers in Ekiti State, Nigeria

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KEYWORDS: Diet Quality, Nutritional Status, Lactating Mothers

BACKGROUND AND OBJECTIVES:

Quality diet during lactation is important for mother and child outcome (1). Maternal undernutrition is a serious public health problem in Nigeria. Low quality diet is one of the determinants of undernutrition. This study analysed the diet and nutritional status of lactating mothers in Ekiti State.

MATERIALS AND METHOD: This hospital based descriptive and cross sectional study involved 368 lactating mothers. Questionnaire was used to collect mothers' socio-demographic information. Body Mass Index (BMI) was calculated from weight and height measurements and classified into underweight (<18.5), normal weight (18.5-24.9), overweight (25.0-29.9) and obesity (\geq 30.0). Minimum dietary diversity for

women (MDD-W) developed by FAO containing ten food groups was used to capture diet quality. The minimum and maximum dietary diversity score (DDS) were zero and 10 respectively. This was categorized into high dietary diversity (consuming ≥ 5 food groups) and low dietary diversity (consuming < 5 food groups). Data were analyzed using SPSS version 20. Chi square was used to establish association of variables at 5% level of significance.

Table 1. Association of mothers' nutritional status with other variables

value	Underweight N (%)	Normal N (%)	Overweight N (%)	Obese N (%)	Chi square	p-
Mother socio demographic Characteristics						
Education						
None	19 (31.1)	46 (21.9)	8 (9.4)	2 (16.7)	35.027	0.000*
Primary	22 (36.1)	38 (18.1)	14 (16.5)	1 (8.3)		
Secondary	13 (21.3)	44 (21.0)	27 (31.8)	2 (16.7)		
Tertiary	7 (11.5)	82 (39.0)	36 (42.4)	7 (58.3)		
Occupation						
Trading	18 (29.5)	42 (20.0)	20 (23.5)	1 (8.3)	45.485	0.000*
Civil service	9 (14.8)	107 (51.0)	41 (48.2)	7 (58.3)		
Teaching	3 (4.9)	10 (4.8)	4 (4.7)	1 (8.3)		
Artisan	9 (14.8)	4 (1.9)	1 (1.2)	0 (0.0)		
Housewife	22 (36.1)	47 (22.4)	19 (22.3)	3 (25.0)		
Living arrangement						
Alone	15 (24.6)	24 (11.4)	6 (7.1)	2 (16.7)	41.965	0.000*
With husband	21 (34.4)	156 (74.3)	64 (75.3)	10 (83.3)		
With relatives	25 (41.0)	30 (14.3)	15 (17.6)	0 (0.0)		
Family size						
<3	1 (1.6)	13 (6.2)	3 (3.5)	1 (8.3)	27.664	0.000*
3-5	22 (36.1)	134 (63.8)	60 (70.6)	8 (66.7)		
>5	38 (62.3)	63 (30.0)	22 (25.0)	3 (25.0)		
Dietary diversity						
Good	21 (34.4)	103 (49.0)	43 (50.6)	6 (50.0)	4.708	0.195
Poor	40 (65.6)	107 (51.0)	42 (49.4)	6 (50.0)		

*significant at $p=0.05$

RESULTS AND DISCUSSION:

Mothers' mean age was 31.39 ± 5.25 ; 20.3% had no formal education, 75.3% were working and 24.7% were housewife. Only 68.2% mothers lived with husband. Family size varied from <3 (4.9%), 3-5 (60.9%) to >5 (34.2%). Underweight mothers (16.6%) and overweight/obese mothers (26.4%); 53% and 47% had low and high dietary diversity score respectively. This implies that the mothers lived on poor quality diet (2). BMI was significantly associated with mothers' education, occupation, living arrangement, family size and dietary diversity score (Table 1). This implies lower prevalence of underweight among mothers with tertiary education (3) and those that lived alone. Conversely, higher prevalence of underweight among mothers in large family and mothers who were housewife (3).

CONCLUSION AND RECOMMENDATION(S):

Some mothers lived on poor quality diet and were malnourished. Nutrition and demographic education intervention is recommended in the study area.

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PA15

Nutritional Status And Dietary Pattern Of Women Traders In Oluwo Fish Market In Epe, Epe Local Government Area, Lagos State, Nigeria

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KEYWORDS: Women traders, Dietary pattern, Market

BACKGROUND AND OBJECTIVES:

The marketplace is an occupational place that can prone individuals to obesity, overweight consume diet higher than recommended levels due primarily to sedentary nature, availability, and accessibility to food (1). Studies on traders across various parts of Nigeria revealed prevalence of obesity to be 16.3% in Ibadan city (2,4), 12.3% in Lagos state (3) and 28.1% in Sokoto. These poor eating habits may likely emerge from lack of information of the total impacts of their eating habits and leads to deficiency of essential nutrients required by the body. There are no current literature or information on the

comparative study on the differences in the nutritional status and dietary pattern of women traders in Oluwo Fish Market, Epe. This study intends to assess the socio-demographic status, determine the dietary pattern, lifestyle practices and nutritional status of women traders in Oluwo Fish Market, Epe.

MATERIALS AND METHOD:

Study Design and technique:This is a cross-sectional survey of traders' nutritional status and dietary pattern relating to their daily eating habit and lifestyle at Oluwo fish market, Epe, Lagos State, Nigeria.

SAMPLING TECHNIQUE: A purposive sampling was adopted in the selection of Oluwo fish market, Epe and a simple random sampling was employed in the selection of the fish traders.

SAMPLE SIZE DETERMINATION: The estimated sample size would be estimated using Cochran's formula: $n = z^2pq/e^2$, Using the formula the data will be drawn from 142 respondents of the population size. Therefore, the sample size was adjusted to 152 to cover for attrition and non-response.

DATA ANALYSIS AND INTERPRETATION: Descriptive statistics of mean, standard deviation, percentages, tables and figures was used to summarize the data collected. Inferential statistics such as Chi square test and Student –t-test.Total Dietary Assessment (TDA) version 3.0 was used to generate the nutrient intake of the respondents, Statistical Package for Social Sciences (SPSS) version 20 and Microsoft Excel was used in data entry, processing, analysis and interpretation in the study.

RESULTS AND DISCUSSION:

Table 1: Anthropometric Status of the Women Traders

Classification	Frequency	Percentage
Underweight (< 18.5 kg/m²)	5	3.3
Normal (18.5 – 24.9 kg/m²)	47	31.3
Overweight (25.0 – 29.9 kg/m²)	30	20.0
Obese (≥30.0 kg/m²)	68	45.3
Total	150	100.0

CONCLUSION&RECOMMENDATION:

The research showed that the respondents' nutritional status, about minority were of ideal body weight. The study has revealed that there is a high prevalence of overweight and obesity. The need to acknowledge and leverage the special role of women requires protecting the socially vulnerable from poverty and ensuring adequate improved nutrition.

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Maternal complementary feeding knowledge, practices and nutritional indices of under-five children in an Urban Comprehensive Health Centre, Eleyele, Ile-Ife, Osun State

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KEYWORDS: Maternal, Under-five, Minimum Dietary Diversity, Minimum meal frequency, Minimum adequate diet, Nutritional indices

BACKGROUND AND OBJECTIVES:

Appropriate feeding practices are integral to normal development in childhood [1]. Knowledge and attitudes of mothers influence the practice of appropriate complementary feeding [2]. Even when mothers introduce complementary feeding on time, it is usually either of inadequate quality or insufficient quantity or both [3]. Nigeria continues to record a low prevalence of appropriate complementary feeding, and there remain gaps in maternal knowledge and key indicators of complementary feeding practices [4]. This study investigates maternal complementary feeding knowledge, key indicators of complementary feeding practices and child nutritional indices in Ile-Ife, Osun State.

MATERIALS AND METHOD:

STUDY DESIGN: It was a facility-based descriptive cross-sectional study. The study took place between April and June 2022 at Urban Comprehensive Health Centre (UCHC), Eleyele, a subsidiary of Obafemi Awolowo University Teaching Hospital (OAUTHC), Ile-Ife, Osun State, Nigeria.

STUDY PARTICIPANTS & INSTRUMENTS:

The study participants were mothers with babies between 6-23 months attending UCHC, Eleyele. A total sample of 285 mother-child pairs were selected from UCHC using a multi-stage sampling technique. A facilitated semi-structured interviewer-administered questionnaire, which had five sections, was used to elicit information. A total of 12 questions, which was scored as 1 for Yes and 0 for No was used to assess maternal knowledge. Minimum meal frequency (MMF), Minimum dietary diversity (MDD) and Minimum adequate diet (MAD) were assessed as key indicators of practice. Nutritional indices were determined using anthropometric parameters. Univariate analysis was done to describe the data.

RESULTS AND DISCUSSION:

- The mothers were between 15 and 44 years, with the modal age being 25-34 years, 178 (62.5%).
- Majority (96.8%) of the mothers were married, and 64.2% had attained a tertiary level of education. Most (87.6%) of these mothers had an estimated monthly income of more than ₦ 30,000 minimum wage.
- Most (61.7%) of the children were between 12-23 months, and mostly males (52.3%)

Table 1: Socio-demographic characteristics of participants

Variables	Frequency (n)	Percentage(%)
Age of mothers (yrs.)		
15-24	45	15.8
25-34	178	62.5
35-44	62	21.8
Marital Status		
Married	276	96.8
Not married	9	3.2
Education level		
primary	9	3.2
secondary	93	32.6
tertiary	183	64.2
Income		
<30,000	35	12.4
≥30,000	247	87.6
Place of delivery		
Home	20	7.1
Hospital	233	82.3
Mission House	30	10.6
Child Characteristics		
Age(mo)		
6-8	51	17.9
9-11'	58	20.4
12-23	176	61.7
Sex		
Male	149	52.3
Female	136	47.7

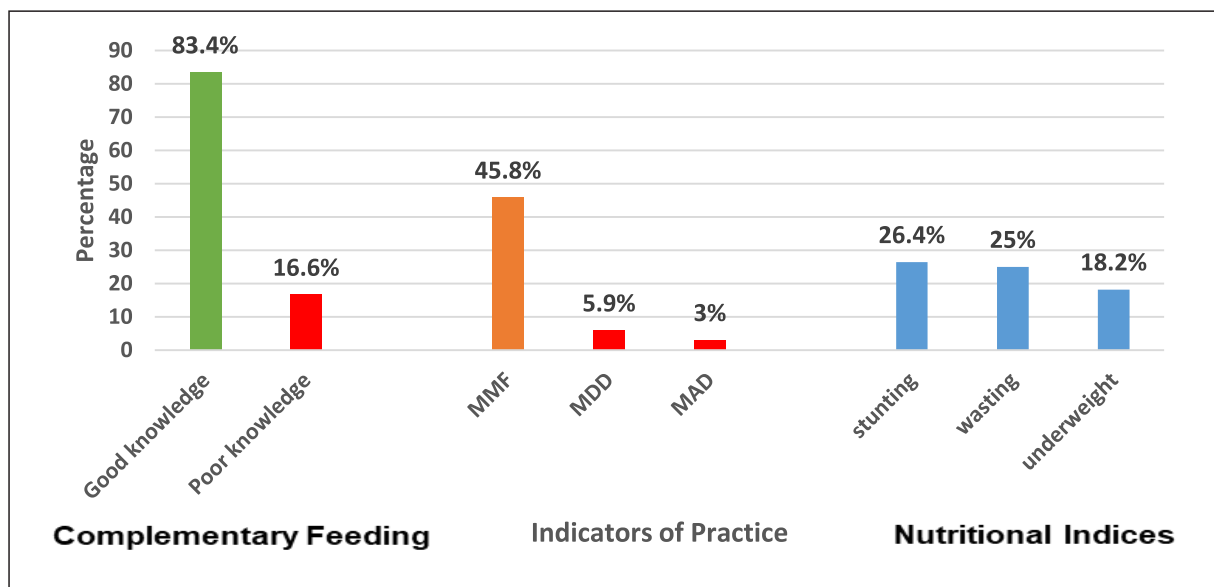


Fig 1: Maternal complementary feeding knowledge and Key indicators of feeding

- The majority (83.4%) of the respondents had good knowledge of complementary feeding.
- However, less than half of the children (45.8%) receive MMF, only 5.9% receive MDD, and 3% receive MAD.
- The prevalence of stunting, wasting and underweight is 26.4%, 25% and 18.2%, respectively.

CONCLUSION AND RECOMMENDATION(S):

- Complementary feeding knowledge is good, but complementary feeding practices were far from optimal.
- Appropriate intervention strategies should focus on improving complementary feeding practices in the studied population.

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OA17

Daily consumption of Pro-vitamin A Biofortified (yellow) Cassava Improved Serum Retinol Concentration in Pre-school children in Nigeria: A randomized controlled trial

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KEYWORDS: Biofortification, serum retinol carotenoids, yellow cassava, randomized controlled trial

BACKGROUND AND OBJECTIVES

Vitamin A deficiency is a public health problem in sub-Saharan Africa. Provitamin A biofortified (yellow cassava) has the potential to contribute significantly to improve vitamin A status, especially in populations that are hard to reach with other strategies.

OBJECTIVE

The study aimed at determining the efficacy of biofortified cassava to improve vitamin A status of Nigerian pre-school children.

MATERIALS AND METHOD

An open label randomized controlled trial was conducted in south-western Nigeria. In total, 176 pre-school children (3 to 5 years old) were randomized into two parallel arms comprising an experimental group (n=88), fed foods prepared from biofortified (yellow) cassava, and a control group (n=88) fed foods prepared from white cassava, twice a day, six days a week for 93 days.

RESULT AND DISCUSSION

A total of 159 children completed the trial (yellow cassava group, n=79; white cassava group, n=80). Children consumed 220.8 $\mu\text{g}/\text{day}$ and 74.1 $\mu\text{g}/\text{day}$ retinol activity equivalents (RAE) from intervention foods in the yellow and white cassava groups respectively. The treatment effect on serum retinol concentrations at the end of the feeding trial was 0.06 $\mu\text{mol}/\text{L}$ (95% CI: 0.004, 0.124), after adjustment for baseline retinol concentrations, inflammation, and asymptomatic malaria status. No significant treatment effect was detected for serum β -carotene (adjusted effect: 3.9%; 95% CI: -0.6%, 8.6%) and gut permeability (adjusted effect: 0.002 (95% CI: -0.089, 0.092). However, a significant effect was detected for haemoglobin concentrations (adjusted effect: 3.08 g/L (95% CI: 0.38, 5.78).

Table 1. Estimated daily intake of β -carotene and RAE¹ from intervention foods during the feeding trial

	White Cassava Group n=79			Yellow cassava group n=80		
	g/day	β -carotene, $\mu\text{g}/\text{day}$	RAE, $\mu\text{g}/\text{day}$	g/day	β -carotene, $\mu\text{g}/\text{day}$	RAE, $\mu\text{g}/\text{day}$
Cassava-based foods ²						
Eba	246 (235, 256)	36.9 (35.3, 38.4)	5.3 (5.0, 5.5)	237 (228, 246)	760.8 (731.9, 789.7)	108.57 (104.4, 112.8)
Garri	35 (33, 37)	18.9 (17.2, 20.15)	2.7 (2.5, 2.9)	32 (29, 34)	305.3 (276.7, 324.4)	43.6 (39.5, 46.3)
Moinmoin	49 (45, 53)	66.0 (60.3, 71.0)	10.2 (8.6, 10.1)	50 (45, 54)	133.0 (119.7, 143.6)	19.0 (17.1, 20.5)
Vegetable soups ^{2,3}						
Okra	62 (55, 69)	251.4 (224.4, 278.4)	35.9 (32.1, 39.8)	55 (50, 59)	221.1 (152.8, 239.0)	31.6 (21.8, 34.1)
Ewedu	12 (10, 13)	145.5 (127.4, 161.5)	20.8 (18.2, 23.1)	10 (9,11)	125.2 (115.4, 133.4)	17.9 (16.5, 19.1)
Total	-	518.7	74.1	-	1545.4	220.8

¹ RAE: Retinol Activity Equivalent; calculated based on β -carotene:retinol conversion factor of 7:1 (23); ² Values are median (interquartile range); ³ The vegetable soup was a mixture of cooked okra+stew and cooked Ewedu+stew (See online supplementary methods for recipes)

Table 2. Treatment effect of consumption of yellow cassava on various outcomes

Outcome/intervention group	n	Estimated mean	Intervention Effect	
			Crude (95% CI)	Adjusted (95% CI)
Serum retinol concentration, $\mu\text{mol}/\text{L}$				
White cassava group	79	0.96 \pm 0.02	Reference	Reference
Yellow cassava group	78	0.99 \pm 0.03	0.032 (-0.042, 0.106) ²	0.06 (0.004, 0.124) ³
Serum β -carotene concentration $\mu\text{mol}/\text{L}$				
White cassava group	79	2.51 (1.76, 3.36) ⁴	Reference	Reference
Yellow cassava group	78	2.64 (2.10, 3.57)	3.3% (-1.2%, 7.8%) ²	3.9% (-0.6%, 8.6%) ⁵
Serum RBP concentration $\mu\text{mol}/\text{L}$				
White cassava group	79	0.86 \pm 0.03	Reference	Reference
Yellow cassava group	80	0.91 \pm 0.03	0.06 (-0.01, 0.13)	0.08 (0.02, 0.14) ⁶
Haemoglobin concentration, g/L				
White cassava group	79	108.5 \pm 9.9	Reference	Reference
Yellow cassava group	80	110.8 \pm 10.0	2.32 (-5.45, 0.81) ²	3.08 (0.38, 5.78) ⁷
Lactulose:mannitol ratio				
White cassava group	78	0.021 (0.018, 0.024)	Reference	Reference
Yellow cassava group	77	0.020 (0.017, 0.023)	0.008 (-0.086, 0.103)	0.002 (-0.089, 0.092) ⁸

CONCLUSION AND RECOMMENDATIONS

Daily consumption of β -carotene from biofortified cassava improved serum retinol and haemoglobin concentrations modestly in Nigerian pre-school children.

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USAID Integrated Health Program applies quality improvement framework to address Early (1st hour) initiation of Breast feeding

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KEYWORDS: Early initiation of breastfeeding, Comprehensive quality of care approaches

BACKGROUND AND OBJECTIVES:

Even a few hours delay in breastfeeding initiation can result in life-threatening issues for a newborn [1]. Health worker knowledge, attitudes, and practices about breastfeeding and colostrum at time hinder early breastfeeding initiation in Nigeria. Nationally, an average of 42 percent of newborns in Nigeria are breastfed within the first hour [2]. However, the U.S. Agency for International Development (USAID) Integrated Health Program (IHP) at program commencement found that 10 percent of newborns were breastfed within the first hour of delivery in many Primary Healthcare Facilities (PHCs) across five states [3].

MATERIALS AND METHOD:

With the State and Local Health Authorities, IHP identified priority quality improvement aims such as: increasing first hour breastfeeding, iron folic acid for pregnant women, skilled birth attendance, and enhanced provision of postnatal care. IHP combined on-site competency-based clinical training, mentoring, routine supportive supervision, data analysis and performance review meetings with PHC staff, M&E experts, and local government stakeholders. Cross-cutting nutrition practices were embedded in child, maternal and postnatal care visits. From September 2021 to June 2022, USAID-IHP supported facilities reached 1.8 million children under five years with growth monitoring and Vitamin A, and 1.2 million pregnant women with breastfeeding counseling and nutrition screening.

RESULTS AND DISCUSSION:

In less than two years, IHP-supported facilities recorded an increase of 1st hour breastfeeding from 10% of live births in IHP-supported health facilities (in 2020) to 90% (in 2022) across PHCs in Bauchi, Kebbi, Sokoto, FCT, and Ebonyi State. These increases were in tandem with Antenatal Care, Skilled Birth Attendance, and Post Natal Care according to Nigeria DHIS2.

The uptake of ANC services grew over two-years with the uptake of iron folic acid during pregnancy, along with increased skilled birth attendance at delivery. This significantly contributed to gains in first hour breastfeeding, since ANC and skilled attendance at birth offer opportunities for primary healthcare workers to support immediate breastfeeding.

The comprehensive quality of care strategy also improved the proportion of deliveries assisted with skilled birth attendance (a known enabler of 1st hour breastfeeding) resulting in other critical high impact health interventions such as partograph and uterotonic use.

Child Growth Monitoring Promotion (GMP) also increased from no reported records (May 2018) to 22,000 quarterly GMP services recorded in March 2022. Monthly 48-hour postnatal care and use of chlorhexidine gel to prevent cord infection utilization doubled to 26,000 patients (Nigeria DHIS2 Data).

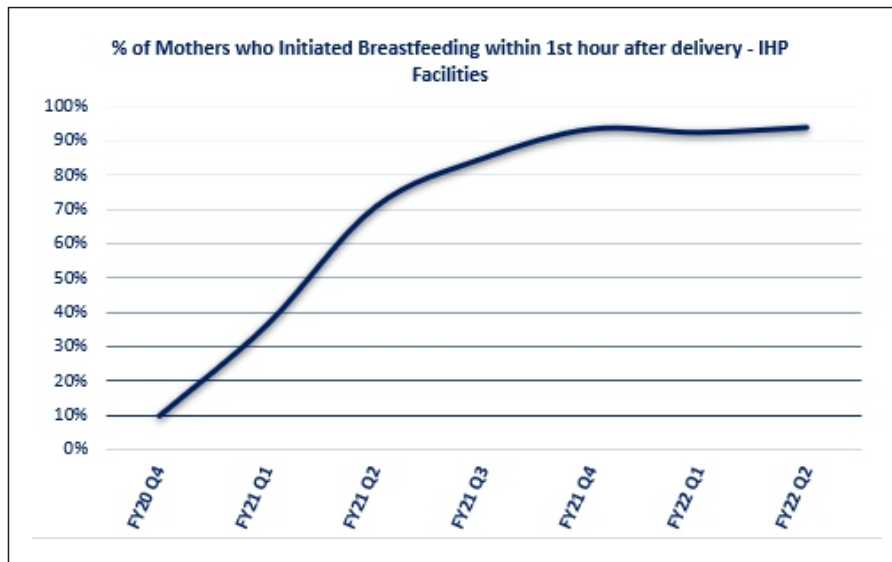


Figure 1. Percent of Mothers Initiating 1st hour across on PHC/ward in Bauchi, Kebbi, Sokoto, Ebonyi and FCT.

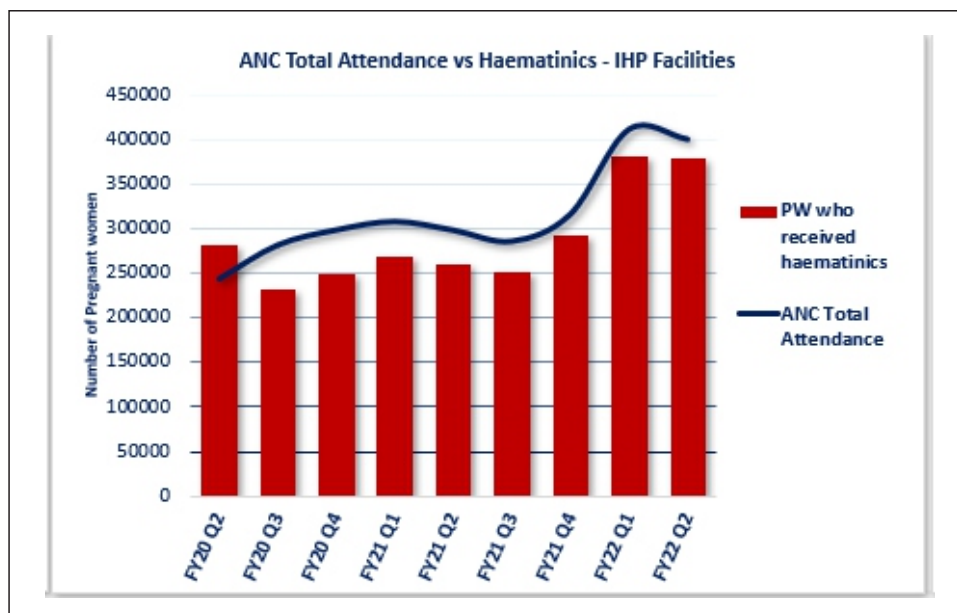


Figure 2. Number of pregnant Women receiving Antenatal Care and Iron Folic Acid across USAID-IHP supported PHCs.

CONCLUSION AND RECOMMENDATIONS:

An integrated Comprehensive Quality of Care approach may lead to stronger and more durable nutritional quality improvement than vertical programs. Integrated Service Delivery Strategies should be championed to achieve nutrition aims across the continuum of care.

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Influence of processing on the phenolic composition and physicochemical properties on runner beans sorghum blends for weaning food.

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KEYWORDS: Runner beans, boiling, mineral contents, pasting characteristics.

BACKGROUND AND OBJECTIVES:

The importance of balanced weaning supplements for promoting children growth and well-being is well recognized. The growth and development of infants and children towards maturity is the result of numbers of competing complementary and interacting influences, and most importantly the supply of sufficient nutrients which are adequate both in quantity and quality. Therefore developing low cost, high protein food supplement for weaning infants has been a constant challenge (1). *Phaseolus coccineus* known as runner beans is a plant in the legume family *Fabaceae*. Runner bean like other legumes are inexpensive sources of proteins and dietary fiber for human diet (2). This study is aimed at assessing the proximate, mineral compositions, and pasting characteristics of blends from runner beans sorghum flour blend intended as weaning food.

Cleaned sorghum grains was soaked, and fermented for 72hrs, washed, wet milled, sieved and allowed to settle. It was dewatered, pressed and dry-milled sieved and packaged. The runner beans were divided into two portions, a portion was boiled and dried and the second portion washed and dried; both portions were milled into flour. The milled runner beans flour was mixed in equal proportion with sorghum flour. The formulated weaning foods were assessed for proximate and mineral composition according to (3) the pasting characteristics were determined using Rapid Visco Analyzer (RVA) and the sensory evaluation conducted by the method described by (4).

The results of the proximate and mineral composition are shown in Table 1. The findings showed that incorporation of runner beans increased the protein from 6.50 to 9.31 % and fiber from 3.35 to 4.12 %, calcium from 254 to 280 (ppm), magnesium from 16.83 to 20.55 ppm and iron from 0.771 to 1.41 ppm significantly ($p < 0.05$) with the incorporation of the runner beans. The pasting characteristics of the blends showed peak viscosity ranging from 95 to 109 RVU, final viscosity from 50-78 RVA and pasting temperature from 80-83 °C respective

The findings in this study revealed that tender runner bean seeds could be valuable as weaning food for combating children malnutrition, with high content of protein than sorghum which served as the control diet. This will enhance the use of local raw materials in alleviating poverty.

Table 1: Proximate and mineral composition of weaning food from runner bean sorghum blend

Parameters	UCRS	CRS	SGM
Moisture (%)	11.26 ± 0.05	10.88 ± 0.03	11.09 ± 0.17
Protein (%)	9.31 ± 0.01	8.75 ± 0.01	6.50 ± 0.02
Ash (%)	2.98 ± 0.02	2.82 ± 0.01	2.54 ± 0.04
Crude fiber	4.12 ± 0.02	3.68 ± 0.02	3.35 ± 0.01
Crude fat (%)	5.24 ± 0.1	4.83 ± 0.01	4.12 ± 0.02
Carbohydrate (%)	67.09 ± 0.06	69.04 ± 0.07	72.40 ± 0.06
Sodium (ppm)	122.73 ± 0.15	118.13 ± 0.05	105.40 ± 0.17
Calcium (ppm)	280.53 ± 0.21	254.87 ± 0.30	237.50 ± 0.30
Potassium (ppm)	213.53 ± 0.06	207.87 ± 0.15	202.50 ± 0.26
Magnesium (ppm)	20.55 ± 0.05	18.30 ± 0.01	16.83 ± 0.01
Phosphorus (ppm)	135.62 ± 0.01	102.86 ± 0.16	90.16 ± 0.15
Iron (ppm)	1.41 ± 0.01	1.20 ± 0.02	0.771 ± 0.01
Zinc (ppm)	0.972 ± 0.01	0.951 ± 0.02	

UCRS=uncooked runner beans with sorghum, CRS= cooked runner beans with sorghum, SGM= sorghum (control). Values are means of triplicates determinants

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Dietary Pattern and Dietary Diversity among Working Class Women in Public and Private Universities in Ogun State

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KEYWORDS: Dietary Pattern; Dietary Diversity; Dietary Diversity score; Working Class Women

BACKGROUND AND OBJECTIVES:

Dietary Pattern and Dietary Diversity of working class women can be affected by the nature of work and socioeconomic status. The aim of this study was to compare the dietary pattern and dietary diversity of working class women in a Private and Public Educational Institutions in Ogun State, Nigeria.

A cross sectional study was conducted among 383 respondents (162 from Private University and 221 from Public University) using self-administered questionnaire for data collection on socio-demographic characteristics, dietary habits and lifestyle, and food frequency questionnaire. Data obtained were analyzed using SPSS for the mean, frequency with percentage and t-test for inferential study. Dietary Diversity Score was calculated using the FAO Dietary Diversity Scoring System (1).

The result showed that the academic staff members were 47.5% and 52.9% of the respondents at the Private and Public University respectively. The family income with the highest percentage - 41.1% and 35.3% was >N500,000 while the most occurring range of money spent on food was between N21,000 and N30,000 with 16.7% (N31,000) and 19.9% (N40,000) in Private and Public University respectively. The respondents had their Dietary Diversity Score (DDS) at the medium level (53.09%) and (46.61%) in Private University and Public respectively. Dietary pattern of respondents shows that vegetables (74.69%), tubers (56.17%) and cereals (40.74%) were the most frequently consumed food groups among the respondents in the Private University. In the Public University, cereals (58.82%), vegetables (71.49%) and tubers (41.63%) were also the most frequently consumed food groups. In comparing the DDS of both Universities, result showed that there was no significant difference; P value = 0.300. In comparing the dietary pattern of the two institutions, the results showed that there were no significant difference ($p > 0.05$) in the consumption of legumes ($p = 0.705$), meats ($p = 0.342$), fruits ($p = 0.587$), Non-GLVs ($p = 0.673$) and vegetables ($p = 0.384$). However, there was a significant difference in the consumption of cereals ($p = 0.017$), root and tubers ($p = 0.000$) and as well as in milk and milk products ($p = 0.000$). At ($p=0.05$), there was no significant association between the respondents' socioeconomic and demographic characteristics with their DDS in both Institutions.

Table 1: Dietary Diversity of the Private and Public University respondents

Dietary Diversity	Private University		Public University	
	Frequency (Percent)		Frequency (Percent)	
Low	51	(31.48)	66	(29.86)
Medium	86	(53.09)	103	(46.61)
High	25	(15.43)	52	(23.53)
Total	162	(100)	221	(100)

Table 2: Dietary Pattern of the Private and Public University respondents

Food Group	Seldom F(%)	Private University (n=162)		Public University (n=221)		
		Averagely F (%)	Frequently F (%)	Seldom F(%)	Averagely F (%)	Frequently F (%)
Cereals	35 (21.6)	61 (37.7)	66 (40.7)	36 (16.3)	65 (29.4)	130 (58.8)
Tubers	26 (16.1)	45 (27.8)	91 (56.2)	70 (31.7)	59 (26.7)	92 (41.6)
Legumes	47 (29.0)	71 (43.8)	44 (27.2)	81 (36.7)	56 (25.3)	84 (38.0)
Meat group	42 (25.9)	55 (34.0)	65 (40.1)	45 (20.4)	82 (37.1)	94 (42.5)
Milk & milk group	66 (40.7)	62 (38.3)	34 (21.0)	51 (23.1)	84 (38.0)	86 (38.9)
Fruits	78 (48.2)	52 (32.1)	32 (19.8)	102 (46.2)	70 (31.7)	49 (22.2)
Veggies (non- GLVs)	84 (51.9)	43 (26.5)	35 (21.6)	111 (50.2)	58 (26.2)	52 (23.5)
Veggies (GLVs)	17 (10.5)	24 (14.8)	121 (74.7)	30 (13.6)	33 (14.9)	158 (71.5)

In conclusion, the socio-economic status of the women working in both Universities did not influence their DD. Also, the consumption of cereals, meat groups and green-leafy vegetables was high while the consumption of fruits and non-GLVs was low among the women in both Universities. Hence, it is recommended that awareness on the benefits of consumption of fruits and non-GLVs be conducted to improve its consumption among women working in these Universities.

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Feeding Pattern and Nutritional Status of Children Aged 13 -24 Months In Yaba LCDA, Lagos State

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KEYWORDS: Anthropometric measurement, food consumption, Stunted, Wasted,

BACKGROUND AND OBJECTIVES:

Good nutrition during the first two years of life is vital for healthy growth and development. Starting good nutrition practices early can help children develop healthy dietary patterns.⁽¹⁾ Child-feeding practices and behavioural interventions may modify patterns of intake. An overview of pediatric obesity treatment concluded that dietary changes accompanied by behaviour change methods, exercise and parental involvement are essential for long-term success.⁽²⁾

The study highlights the nutritional status of children between 13 and 24 months and their feeding pattern during their first two years in YABA LCDA.

MATERIALS AND METHODS:

Semi-structured questionnaires with sections requesting information about anthropometric data, and dietary intake with food frequency were used. Three hundred Children were assessed. The data collected were analyzed using the statistical package for social sciences (SPSS) version 20 and expressed in frequency and percentage. The results were represented in tables and charts using descriptive statistics. The statistical method used for the analysis is cross tabulation and chi-square.

RESULTS AND DISCUSSION:

The research showed that 4.7% of children are severely malnourished, 43.6% of children are moderately malnourished (yellow), and 110% of children are well-nourished. The above table shows the statistical representation of respondent's measurements among the 300 research respondents. Respondents' highest, lowest and average weights were 14.5kg, 8.7 kg, and 11.8 kg respectively. The height distribution shows that the tallest child among the 300 respondents was 0.86m, the shortest was 0.64m, and the average height was 0.75m. Mid Upper Arm Circumference shows 15cm and 11.3cm as the highest and lowest measurements. The mean MUAC of respondents is 12.7cm indicating that on average over 150 were normal.

CONCLUSION AND RECOMMENDATIONS:

The children primarily consume milk, protein foods and snacks. There is a significant positive effect of the type of food consumed on children's weight. The nutrition status of children in the study location was good.

Table 1: Respondents' Anthropometric Measurements

Measurement	Number	Highest	Lowest	Mean
Weight(kg)	300	14.5	8.9	11.8
Height(m)	300	0.86	0.64	0.75
MUAC(cm)	300	15	11.3	12.7

Highest/lowest and mean weight and height

Table 2: Distribution Frequency of Weekly Food Consumption

Food groups	Male		Female		Total	
	N	%	N	%	N	%
Breast Milk and Cereals						
NONE	26	8.7	15	5	41	13.7
1-2 Times	54	18	33	11	87	29.0
3-4 Times	68	22.7	51	17	119	39.7
5-7 Times	35	11.7	18	6	53	17.7
Starchy Foods						
None	28	9.3	12	4	40	13.3
1-2 Times	89	29.7	67	22.3	156	52.0
3-4 Times	36	12	32	10.7	68	22.7
5-7 Times	30	10	6	2	36	12.0
Protein						
None	5	1.7	8	2.7	13	4.3
1-2 Times	102	34	85	28.3	187	62.3
3-4 Times	65	21.7	12	4	77	25.7
5-7 Times	11	3.7	12	4	23	7.7
Egg						
None	11	3.7	6	2	17	5.7
1-2 Times	99	33	87	29	186	62.0
3-4 Times	59	19.7	10	3.3	69	23.0
5-7 Times	14	4.7	14	4.7	28	9.3

CONCLUSION AND RECOMMENDATIONS:

The children primarily consume milk, protein foods and snacks. There is a significant positive effect of the type of food consumed on children's weight. The nutrition status of children in the study location was good.

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The Association Between Dietary Habits, Physical Activities and Family Setting in Adolescent Sickle Cell Disease Patients.

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KEYWORDS: Adolescents, dietary habits, physical activity, Sickle cell disease

BACKGROUND AND OBJECTIVES:

Sickle cell disease (SCD) is a monogenic disorder of haemoglobin synthesis which is characterized by different types of crises and frequent hospitalization. A prominent feature of the disease is stunted growth which could be attributed to inadequate nutrition, though other factors which are haematologic, endocrine and metabolic also play significant roles [1]. Poor dietary habits have been shown to play significant roles in non-communicable diseases [2,3] but no study has looked at the dietary habits of patients with sickle cell disease especially in low-middle income countries where the disease is commonest. The aim of this descriptive study is to investigate dietary habits and physical activities in adolescent sickle cell disease patients.

MATERIALS AND METHODS:

This is a cross-sectional study of dietary habits and physical activities of adolescent (11-19 years of age) sickle cell disease patients from the Aglow sickle cell club, Ijaiye, Abeokuta and the Iyesubomi sickle cell club, Ijebu-Ode both in Ogun state, Nigeria. Data was collected using a semi-structured interviewer administered questionnaire adapted from the Youth Risk Behaviour Survey developed by Centre for Disease Control and Prevention (CDC). STATA statistical software version 13 was used to enter, code and analyze the data.

RESULTS AND DISCUSSION:

The mean age of the 122 respondents was 15.7 ± 2.3 years, of which 51 (41.8%) were males and 77 (63%) were from monogamous homes (Table 1). Though there was no association between family type and dietary habits (χ^2 (2.67), $P=0.26$), participants who live with their parents were more likely to have better dietary habits (χ^2 (4.6), $P=0.03$). Studies have associated poor family setting and low socioeconomic status with poor dietary and inadequate physical activities among adolescents [4]. Our study showed that adolescents from polygamous or single parent homes were less likely to be physically active. Though family setting did not affect the dietary habits of our patients but living with their parents was positively associated with good dietary habits. This buttresses the finding that family support and the habit of eating together every day as a family is positively associated with better diet among adolescents [5].

CONCLUSION AND RECOMMENDATION:

Dietary habits and physical activities of adolescent SCD patients was above average in comparison to adolescents in low resource countries. It is recommended that health care professionals and parents should encourage physical activity among SCD patients as this may be helpful in boosting not only their health but also their stature.

Table 1: Sociodemographic Characteristics of Participants

Sociodemographic Variable	Frequency (%)
Age (Years)	
11-14	42(34.4)
15-19	80(65.6)
Gender	
Male	51(41.8)
Female	71(58.2)
Educational level	
Primary	1(0.8)
Junior Secondary	6(4.9)
Senior Secondary	107(87.7)
Tertiary	8(6.6)
Family Type	
Monogamous	77(63.1)
Polygamous	38(31.2)
Single parent	7(5.7)

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PA23**Stress Associated Factors Limiting Breastfeeding Practices Among Working-Class Nursing Mothers In Lagos State, Nigeria**

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KEYWORDS:**BACKGROUND AND OBJECTIVES:**

Stress reduces human productivity and nursing mothers are not exempted of its impacts which could lead to poor and suboptimal breastfeeding practices, poor maternal care and childhood malnutrition (1). This study

assessed level of maternal stress and its associated factors which limit breastfeeding practices among working-class nursing mothers in Lagos State, Nigeria.

MATERIALS AND METHOD

This cross sectional study was conducted among 200 randomly selected mothers. Information on socio-demographic characteristics and breastfeeding practices was obtained by a well-structured questionnaire. International Stress Management Questionnaire was used to measure stress level. Body Mass Index (kg/m^2) was calculated. Data was analyzed by SPSS version 21.0. Mean, frequency and standard deviation were measured. Association of variables was defined by chi-square at $p < 0.05$.

RESULTS AND DISCUSSION

More than half (60.5%) of respondents were within age of 26-30 years, 60% were Yoruba, only 50% had tertiary education, 46.0% were civil servants, 78% worked in private sector, 88% were married while 12.0% were single mothers; 90% had monogamous homes and 55.5% earned 61-80,000 naira monthly, 97.5% and 3.0% were moderately and highly stressed respectively. Respondents having normal body weight and overweight were 30.0% each while obesity was 39.4%. Only 26.5% stayed at home (5-6 months) for maternity leave, 82.5% nursed either 2nd and 3rd child, 17.5% nursed first child, 44.0% started daycare within 5 months of age and only 21.0% practiced exclusive breastfeeding. Table 1 presents factors associated with maternal stress. This affirms previous studies which identified social and environmental factors such as maternal health problems and demand of mothers' work as constraints to optimal breastfeeding practices in Southwest Nigeria (2). Family and work responsibilities coupled with care for the infants place immense burdens on mothers and influence their physical and mental health (3).

Table 1. Association of Maternal Stress with Socio-demographic Characteristics

Variables	Stress			λ^2	P value
	Moderate 194(97.0%)	High 6(3.0%)	Total 200(100.0%)		
Duration of maternity leave					
≤1 month	31(15.5)	0(0.0)	31(15.5)	9.675	0.022*
2 months	72(36.0)	6(3.0)	108(39.0)		
3-4 months	38(19.0)	0(0.0)	38(19.0)		
5-6 months	53(26.5)	0(0.0)	53(26.5)		
Age child started day-care or being given to caregiver					
2-3 months	29(14.5)	0(0.0)	29(14.5)	14.782	0.002*
4-5 months	53(26.5)	6(3.0)	59(29.5)		
6-7 months	106(53.0)	0(0.0)	106(53.0)		
Others	6(3.0)	0(0.0)	6(3.0)		
Child has started taking infant formula					
Yes					
No	115(57.5)	6(3.0)	121(60.5)		
Duration of exclusively breastfeeding before introducing formula					
2-3 months	66(33.0)	0(0.0)	66(33.0)	23.370	<0.001*
4-5 months	92(46.0)	0(0.0)	92(46.0)		
6 month	36(18.0)	6(3.0)	42(21.0)		

CONCLUSION AND RECOMMENDATION

Poor breastfeeding practice among working-class nursing mothers in Lagos State, Nigeria is related to stress and it contributes to low exclusive breastfeeding, early enrolment of infants to daycare and early introduction of infant formula. Implementation of policy on 6 months maternity leave for public service workers needs regulation in Nigeria. Education on infant and young child feeding practice needs to be promoted to minimize maternal stress.

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PA24

Nutritional Knowledge of Pregnant Women of Child Bearing Age in selected public health Facilities in Abeokuta South Local Government Ogun State, Nigeria.

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KEYWORDS: Pregnant Women, Nutritional Status, Low Birth Weight, Nutrient Intake

BACKGROUND AND OBJECTIVE:

Food choices of pregnant women in developing countries are often based on ignorance, misconceptions, superstitions, traditional/cultural beliefs resulting in poor dietary patterns and lifestyle which have capacity of endangering the growth of the fetus (1). The objective of this study was to assess the nutritional knowledge of pregnant women in selected public health facilities in Abeokuta South Local government, Ogun State, Nigeria.

METHODS: Cross-sectional study design was used to assess 600 pregnant women attending antenatal clinic at the Federal Medical Center and State Hospital, Abeokuta Ogun state. A semi structured questionnaire was used to obtain information on socio-economic characteristic, nutrient intake and food

consumption pattern. The nutritional knowledge was assessed using standard method as described by (3) with little modification and classified accordingly. Mid-upper arm circumference was measured with MUAC tape while the data was analysed using statistical package for social science (SPSS) version 16.0 and the results were compared with standard

RESULTS: The study revealed that less than half of the respondents (46.12%) had good nutritional knowledge, 27.96% were moderate while 25.91% of them had poor nutritional knowledge. The anthropometric characteristics of the respondents showed that majority of the respondents (81.3%) had normal weight, while 6.7% of the respondents were over nourished.

Figure 1: Nutritional Knowledge of Respondents

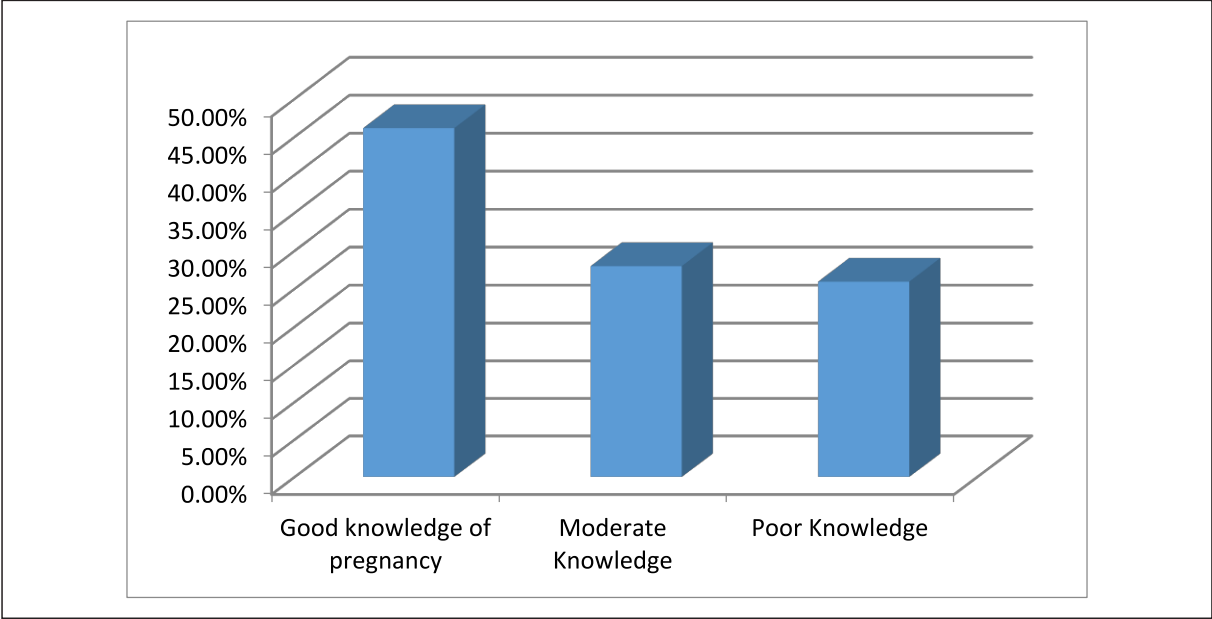


Table 1: Anthropometric Characteristics of the Respondents

Variables	Frequency	Percentage (%)
MUAC		
Normal weight/nourish	488	81.3
Over-nourished	112	18.7
Total	600	100

CONCLUSION: The nutritional knowledge of the respondents were poor as less than half of the respondent had good nutritional knowledge relating to pregnancy. The adequacy of nutrient intake of the respondent was low as majority of the respondent couldn't meet with the requirement which also confirmed their knowledge.

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PA25

Food Based Approaches informed by Positive Deviance Inquiry to Sustainably Address Malnutrition

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KEYWORDS: Positive Deviance Inquiry, Food Based Approaches, Malnutrition

BACKGROUND AND OBJECTIVE:

Under five child stunting, wasting and minimum acceptable diets in Sokoto State (55%, 17.5%, and 6.5%) is among the worst in Nigeria (NDHS, 2018). Due to the lack of Ready to Use Therapeutic Food (RUTF), the United States Agency for International Development (USAID)-supported Integrated Health Program started a food-based approach to improve and prevent malnutrition through dietary diversity, nutrition screening, recipes, demonstrations, peer learning, and counselling across 81 primary healthcare facilities in two States.

MATERIALS AND METHOD

Using findings from a rapid Positive Deviance Inquiry (PDI) with well-nourished children in food insecure environments, IHP identified local foods and recipes to inform food-based approaches to address malnutrition in the PHC setting. In 3 communities (66 households total), IHP used Mid Upper Arm Circumference (MUAC) and weight for age to identify well-nourished children. Foods used by these households included enriched bean porridge, soups, nuts, seeds and locally/wild grown fruit and vegetables. Notably, well-nourished children in Sokoto ate grasshoppers as snacks, or ground and mixed into foods like pap, or added to meals for protein.

Primary Healthcare Workers were mentored to address malnutrition through IYCF counselling and preparation of healthy and affordable meals for children using the foods identified through PDI. Volunteers were engaged to conduct house-to-house nutrition screening, counselling and referral of MAM and growth faltering. In a 12-week pilot period, Sokoto convened four sessions of food-based counselling and demonstrations across approximately 40 PHCs in a 12 week period over intervals of 1-2 weeks.

RESULTS AND DISCUSSION

In Sokoto, 170 malnourished children were enrolled in the program. Of those, at least 30 percent recovered (based on mid-upper arm circumference and weight for height readings). An additional 12 children (7 percent) also transitioned from severe to moderate malnutrition within the 12-week time frame. Dietary Diversity among enrolled children increased from 4.95 food groups to 5.5.

Table 1: Total Number of MAM and SAM children enrolled in the intervention

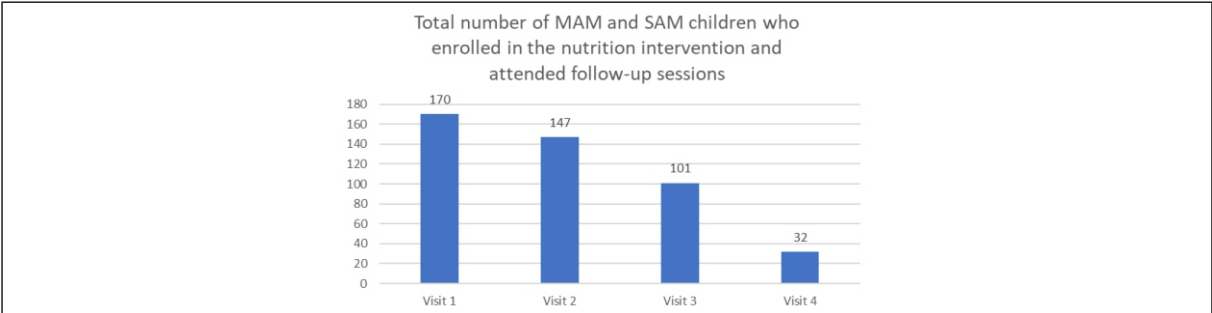
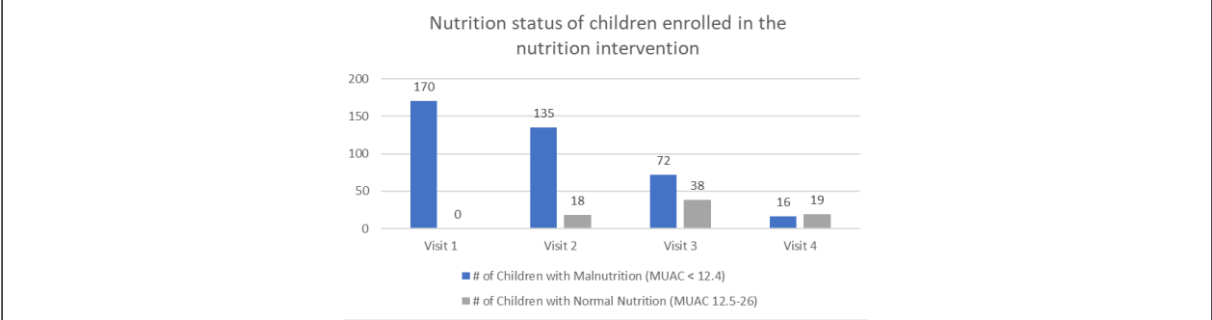


Table 2: Nutrition status of children enrolled in the nutrition intervention



CONCLUSION AND RECOMMENDATIONS

Positive Deviance Inquiry, which identifies locally available, palatable and affordable foods can improve dietary diversity, and food frequency. When combined with nutrition counseling, food demonstration and, cultivation/processing advisory services, food based nutrition approaches can help address moderate malnutrition. The IHP Sokoto pilot found that 30% of children in a small pilot of 170 children gained weight while enrolled in the food-based sessions at the Primary Healthcare Setting. While therapeutic foods and lipid based nutritional supplements are commonly preferred for treating acute malnutrition, the lack of availability and affordability of these foods in Sokoto and Northern Nigeria has required that primary health facilities to identify alternative, free, unsubsidized methods to address malnutrition. Early evidence from the IHP Sokoto program suggests that the food based approach can augment (but not replace) conventional Community Based Management of Acute Malnutrition and Lipid-based Nutrition Supplements programs which rely on more expensive Ready to Eat Therapeutic Foods.

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OA26

Infant and Young Child Feeding Practices among Mothers of Under-five Children in Ibadan North East Local Government Area, Oyo State

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KEYWORDS: Exclusive breastfeeding, infant and young child, complementary feeding.

BACKGROUND AND OBJECTIVES:

Malnutrition contributes more than one third of all child deaths. Optimum Infant and young child feeding (IYCF) practices during the first two years of life are essential to improve survival, growth and development of a child (1). This study was conducted to assess IYCF practices among mothers of under-five children in Ibadan North East Local Government Area, Oyo State.

MATERIALS AND METHOD: This study was cross-sectional in design. A multi-stage sampling, simple and systematic random sampling techniques were adopted to recruit 220 mother/under-five child pairs. A well-structured questionnaire was used to collect data on the socio-demographic variables, breast feeding practices and complementary feeding practices. The Infant and Child feeding practices score of the under-five children was obtained from a combination of five indicators which include: timely initiation of breast feeding, EBF, timely initiation of complementary feeding, introduction of solid, semi-solid and soft foods and continued breast feeding at one year on a scale of 10 (2 points for each correct practice). This was further categorized as adequate (>70%), moderate (40-69%) and poor (≤39%) practices. Anthropometric characteristics (length/height and weight) of the children were measured according to WHO Standards. Descriptive statistics (frequency and percentages) and inferential statistics (chi-square and Pearson correlation) were used to establish the relationship between anthropometric characteristics and IYCF practices.

RESULTS AND DISCUSSION: The result showed that more than half of the children were males (51.3%) while 55% of the mothers were artisans. Only 45% of the mothers initiated breastfeeding less than 30

minutes after delivery and 25% within 1-3 days. About 30% of the children did not receive colostrum at birth while 35% received pre-lacteal food. Only 17% of the mother practiced Exclusive Breastfeeding. Timely introduction of complementary feeding at 6 months was not practiced by 69.5% of the mothers. It has been reported that only 23% of infants (6 -23 months) in Nigeria, are fed in accordance with the recommendation of IYCF (2). About 40% introduced home prepared meals to their children as complementary foods while only 35.6% introduced pap. Only 29.3% of the children were currently being breastfed during data collection, however 13.9% continued breastfeeding up to 15 months while 11.3% breastfed up to 2 years. The result also showed that only 20.5% of the mothers gave food from the 6-8 food groups to their children while 26.2% had adequate IYCF practices. The prevalence of stunting, wasting and underweight was 30.1%, 3.1% and 9.7% respectively among the children. There was no significant relationship between exclusive breastfeeding, height-for-age, weight-for-age and weight-for-height (P=0.611, P=0.363 and P= 0.216) respectively. The chance of poor feeding practices was significantly higher (P=0.001) among mothers with low educational levels.

CONCLUSION AND RECOMMENDATION: The study revealed that the prevalence of exclusive breastfeeding (EBF) is low and infant feeding practices are below average. There is therefore an urgent need for increase in level of awareness and intervention on the significance of exclusive breastfeeding and adequate infant and young child feeding practices.

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PA27

Nutrient Composition of Indigenous Soybased Fortifier and Plumping Meals are Comparale to UNICEF Ready-to-Use-Therapeutic Foods (RUTFs)

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KEYWORDS: Soy-based fortifier, plumping meal, RUTF

BACKGROUND AND OBJECTIVES:

Globally, malnutrition underlies forty five percent of deaths in children under-five, leading to an estimated 3.1 million deaths per year. Severe acute malnutrition (SAM) is the most serious manifestation of under nutrition. Ready-to-use-Therapeutics Foods (RUTFs) is a life-saving essential supply item that treats severe wasting in children under five years old. Therefore, sustainable treatment of severe acute malnutrition can

be challenging in the absence of locally produced RUTF (Okoth, *et al.*, 2017). The aim of this study was to compare the nutrient composition of soy-based fortifier and plumping meal with the standard UNICEF RUTFs. The specific objectives are to: (1) determine the proximate composition of the locally formulated meals and the RUTF and (2) assess selected minerals in the locally formulated meals and the RUTF

MATERIALS AND METHOD: Soy-based fortifier and plumping meal were prepared at the Federal Teaching Hospital Ido, Ekiti State. RUTF was gotten from UNICEF office, Maiduguri, north east Nigeria. The proximate, selected minerals and vitamins composition of the samples were determined using standard methods of AOAC. Data were analyzed using descriptive statistic and ANOVA was used to compare the mean difference between the three samples with *P*-value set at $\alpha < 0.05$.

RESULT AND DISCUSSION:

Table 1: Proximate composition of Soy-based fortifier Plumping meal and RUTF (g/100g) dry weight basis (g/100g) dry weight basis

Parameters	Soy-based fortifier	Plumpy meal	RUTF
Moisture*	3.31 ± 0.14 ^b	3.50 ± 0.20 ^b	-----
Crude protein	33.0 ± 0.00 ^b	17.4 ± 0.00 ^a	14.0 ± 0.30 ^a
Crude fat	31.4 ± 0.02 ^a	18.3 ± 1.01 ^d	31.3 ± 0.10 ^b
Crude fibre*	1.11 ± 0.10 ^d	1.30 ± 0.01 ^c	-----
Ash*	2.01 ± 0.10 ^c	1.40 ± 0.20 ^a	-----
Carbohydrate	30.0 ± 0.10 ^c	58.2 ± 1.11 ^d	50.4 ± 0.30 ^a
Energy	2227.0 ± 3.04 ^a	1952.0 ± 5.01 ^b	540.0 ± 1.11

RUTF-Ready-to-use therapeutic foods. Results represent MeanSD of two determinations. Values on the same row with different superscripts are significantly different ($p < 0.05$). T-test was used to analyzed sample with only two groups

Table 2: Mineral Composition of Soy-based meal, Plumpy meal and RUTF (mg/100g) dry weight basis

Parameters	Soy-based fortifier	Plumping meal	RUTFs
Calcium	111 ± 0.01 ^a	120 ± 0.01 ^b	518.0 ± 1.11 ^c
Magnesium	74.3 ± 0.01 ^d	75 ± 0.02 ^b	115.0 ± 0.14 ^a
Potassium	51 ± 0.01 ^b	52 ± 0.01 ^d	1213.0 ± 0.42 ^a
Iron	40.1 ± 0.01 ^c	42 ± 0.01 ^a	12.0 ± 1.01 ^b
Sodium	1130 ± 0.12 ^b	1065 ± 0.10 ^c	199.0 ± 0.10 ^d
Phosphorus	32 ± 0.01 ^d	32 ± 0.01 ^b	423.0 ± 0.10 ^e
Copper	13.0 ± 0.10 ^c	11.1 ± 0.10 ^e	2.00 ± 0.42 ^d

RUTFs- Ready to use therapeutic foods. Results represent Mean SDM of two determinations. Values on the same row with different superscripts are significantly different ($p < 0.05$)

CONCLUSION:

Nutritional composition of locally formulated soy-based fortifier and plumping meals are comparable to RUTF as both are adequate and rich sources of macronutrients and micronutrients.

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OA28

Assessment of anthropometric indices, serum iron and zinc status of female adolescents in secondary schools in rural Nigerian communities.

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KEYWORDS: Adolescents, Anthropometric Indices, Serum Iron, Serum Zinc

BACKGROUND AND OBJECTIVES:

Adolescents are vulnerable from the nutritional point of view, due to their peculiar lifestyle and dietary habits and to their high energy and nutrient requirements accruing from the growth spurt experienced during adolescence. Adolescent girls are often dissatisfied with their body image, and so they indulge frequently in slimming diets, even though they may have a healthy weight. Thus, they engage in some unwholesome dietary practices that increases their risk of malnutrition. This study, therefore, assessed the anthropometric indices, serum iron and zinc status of female adolescents in secondary schools in Uzo-Uwani Local Government Area, Enugu state.

MATERIALS AND METHODS: The study adopted a survey design. A total of 403 respondents were selected using multi-stage sampling technique. Six government owned secondary schools in Uzo-uwani LGA of Enugu state were selected for the study. The height and weight measurements of the students were assessed and used to determine their anthropometric indices. Questionnaire was used to elicit information on socio-demographic and dietary practices of the respondents. Serum ferritin, hemoglobin, C- Reactive Protein, and zinc levels of the respondents were analyzed using standard procedures. Data obtained was coded and analyzed using the computer software package; Statistical Product for Service Solution, (SPSS) (version 21). Chi-square was used to define relationship among variables. Significance was accepted at $P < 0.05$.

RESULTS AND DISCUSSION: More than half (53.0%) of the respondents were aged 16-19 years. Majority (90.8%) of the respondent had fathers as breadwinners. There was a high prevalence of stunting (76.7%), thinness (23.6%), iron deficiency (90.0%) and zinc deficiency (55.0%) amongst the respondents. A good number (32.4%) of the respondents aged 13-15 years were severely stunted. About 29% of the respondents aged 16-19 years were

Table 1: Cross tabulation of respondent's biochemical parameters with age

Variables	10-12(yrs.) F (%)	13-15(yrs.) F (%)	16-19(yrs.) F (%)	Total F (%)
Serum Ferritin				
Normal(<15µg/l)	1(25.0%)	3(10.0%)	1(6.7%)	5(10.3%)
Iron deficient	3(75.0%)	18(90.0%)	14(93.3%)	35(89.7%)
Total	4(100.0%)	20(100.0%)	15(100.0%)	40(100.0%)
	X²=1.156^a	df=2	P=.561	
Hemoglobin				
Normal(<11.5 g/dl (10–11 years) and 12 g/dl (≥12 years)	0(0.0%)	7(35.0%)	7(35.7%)	14(31.6%)
Mild anemia(12>Hb>10.5 g/dl)	2(50.0%)	5(25.0%)	5(35.7%)	12(31.6%)
Moderate anemia(7.5<Hb ≤10.5 g/dl)	1(25.0%)	8(40.0%)	3(21.4%)	12(31.6%)
Severe anemia (Hb<7.5 g/dl).	1(25.0%)	0(.0%)	1(7.1%)	2(5.3%)
Total	4(100.0%)	20(100.0%)	14(100.0%)	40(100.0%)
	X²=7.261^a	df=6	P=.297	
Zinc				
Normal (<59 µg/dl)	1(25.0%)	8(40.0%)	9(53.3%)	18(43.6%)
Zinc deficient	3(75.0%)	12(60.0%)	7(46.7%)	22(56.4%)
Total	4(100.0%)	20(100.0%)	15(100.0%)	40(100.0)
	X²=1.246	df=2	P=.536	

moderately thin. Most (90%) of the respondents aged 13-15 years were deficient in iron. More than half (60.0%) of the respondents aged 13-15 years were deficient in zinc. Less than half (40.0%) of the respondents aged (13-15) years were moderately anaemic.

Majority of the respondents aged (16-19) years were deficient in iron. This is contrary to the findings of Onoja, Iloeje, Onoja and Uzor (1) who reported a prevalence rate of 5.0% among adolescent school girls (10-19 years) in south eastern Nigeria. Iron-deficient anaemic adolescent girls may experience poor pregnancy outcome in adulthood, reduced cognitive functions and in severe cases, chronic heart failure. High prevalence of zinc deficiency reported in this study is comparable to the findings of Ibekwe and Ibekwe, (2) who reported a high prevalence (58.3%) of zinc deficiency among adolescent school girls in Delta state.

CONCLUSION AND RECOMMENDATION:

The was a high prevalence of malnutrition (especially stunting, iron and zinc deficiency) in the study area. Nutrition education is imperative to enlighten the people on the right choice of foods to curtail the high prevalence of undernutrition amongst them.

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Comparison Of The Effects Of Different Processing Methods, On The Nutrient Quality And Protein Digestibility Of Soybean-Fortified Powder (Tom Brown) From Three Selected Hospitals In South-West, Nigeria.

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KEYWORDS: Soybean powder, food fermentation, protein digestibility, food processing

BACKGROUND AND OBJECTIVES:

Soybean powder is a good source of plant protein and other essential nutrients used to fortify infant complementary diets and are being produced by various organizations and households in Nigeria, especially hospitals [1]. Different recipes and processes are being adopted. Processing can alter the sensory appeal, nutritive value and protein digestibility of soybeans but to what extent is not known [2]. This research was conducted to compare the effects of different processing methods, on the nutrient quality and protein digestibility of soybean powder sampled from three selected hospitals in South-west, Nigeria.

BROAD OBJECTIVE

The study compared the processing methods, effects on the nutrient quality and protein digestibility of soybean fortified powder (Tom brown) from three selected hospitals in South-west, Nigeria.

SPECIFIC OBJECTIVES

1. To determine the different methods of processing soybean-fortified powdered in Federal Medical Centre, Abeokuta, Our Lady of Apostle Catholic Hospital, Ibadan and University College Hospital, Ibadan.
2. To compare the effects of the processing methods adopted in these hospitals on the nutrient quality of soybean fortified powder.
3. To compare the protein digestibility of soybean fortified powdered from these hospitals.

METHODS: This was a cross-sectional study. Thermal processing methods (consist of boiling and roasting) were used to process soybean in two hospitals, while fermentation was used in the remaining one. Soybean powder samples were collected purposively from hospitals that adopt different methods of processing and analyzed in duplicate to determine their effects on proximate composition (crude fibre, protein, crude fat, carbohydrates) of difference processing methods using the methods of Association of Official Analytical Chemists. The minerals, vitamins, and protein digestibility were determined by Atomic Absorption Spectrophotometer, Spectrophotometry, and Acid Fiber Detergent, respectively [3]. The data were analysed using descriptive statistics and Analysis of Variance (ANOVA).

RESULTS:

Table 1. Mean value of Proximate Analysis

Nutrients (g)	sample A	sample B	sample C
methods of processing	Boiled	Roasted	Fermented
Moisture content (g)	8.66	11.22	11.48
Crude protein (g)	36.01	37.56	41.73
Crude fat (g)	27.23	16.93	13.01
Crude fibre (g)	1.97	3.84	1.28
Total Ash (g)	4.50	4.89	5.31
Carbohydrates (g)	21.62	25.58	27.21

Table 2.: Analysis of Variance of Mean difference of Protein Digestibility in Soybean powder

Sample A	Sample B	Sample C	Fratio	P-value
85.10 (0.09)	84.23 (0.05)	88.17 (0.06)	1827.95	<0.001

DISCUSSION: The fermented soybean powder showed highest value for crude protein (41.73%), iron (13.45mg/100g), -carotene (7.48 μ g/100g), total Ash (5.31g/100g), carbohydrates (27.2g/100g) and protein digestibility (88.17%) compared to other method of processing. However, the fermented sample showed lowest value of vitamin C (5.06mg/100g) and Vitamin B1 (0.46mg/100g) content

CONCLUSION AND RECOMMENDATION:

The conclusion drawn from this research had established that there is variation between processing method of soybeans and its overall nutrient quality. In other words, processing of soybeans influences its nutrient composition. Fermentation of soybeans improved the nutrient quality of soybean and its protein digestibility [4]. It is therefore recommended that there should be standardization of processing methods for soybean for good quality nutrients and protein digestibility.

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Relationship between maternal workload and the nutritional status of preschool children (2-5years) in Nsukka Metropolis

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KEYWORDS: Anthropometric indices, maternal workload, under-five children, nutritional status.

BACKGROUND AND OBJECTIVES:

Globally, 149.2 million children under the age of five were stunted (22%), 45.4 million were wasted (13.6%), and 38.9 million were overweight (5.7%) in 2020(1). Malnutrition continues to be a devastating problem in many developing countries, affecting many people and causing numerous child deaths. Mothers exert strong influence over child feeding practices which play a vital role in determining child health and nutritional status. In recent times, women have been seen playing the dual role of motherhood and homemaker, which has resulted in the neglect of the conventional methods of childcare. As a result, they have little or no time to spend caring for their children, which has an impact on their health and nutritional status. The extent and pattern of this impact are still unknown. This study therefore seeks to investigate the relationship between maternal workload and nutritional status of preschool children (2-5years) in Nsukka metropolis.

MATERIALS AND METHOD:

A total of 386 respondents were selected using multi-stage random sampling. A structured questionnaire was used to elicit information on personal data, socio-economic characteristics, dietary diversity and maternal workload. Anthropometric measurements were obtained and classified into stunting, wasting and BMI-for-Age. Maternal workload was assessed by number of hrs spent working. Data obtained were analyzed using SPSS, version 23. Bivariate (chi-square) analysis was used to assess the relationship between maternal workload and nutritional status. Variables were considered to be significant at $p < 0.05$.

RESULTS AND DISCUSSION:

Mothers with children under the age of five are one of the growing segments of the labor force in Nigeria. Our findings showed that more than half of the mothers work for over 40 hrs per week. This to some extent emphasized the effect of women empowerment which is in line with the sustainable development goals of promoting economic growth. Maternal workload was found to be related to stunting but not to wasting, underweight, or dietary diversity score [Table 1]. Although maternal work is expected to provide an additional source of income that can improve household food security, it may have a negative impact on the mother's ability to provide adequate nutrition. Previous research had established a link between these variables, however, Utter et al. (2) emphasized that the possibility of other variables influencing maternal workload should not be overlooked.

Table 1: Relationship between maternal workload and nutritional status of preschool children

Anthropometric indices		Maternal Workload			p value
		Low	Normal	Excess	
Wasting	Severely wasted	-	2(0.5)	-	0.292
	Moderately wasted	2(0.5)	33(8.6)	24(6.3)	
	Normal	19(5.0)	134(35.1)	131(34.3)	
	Above normal	2 (0.6)	16 (4.2)	19 (5.0)	
Stunting	Severely stunted	2(0.5)	8(2.1)	4(1.0)	< 0.00
	Moderately stunted	8(2.1)	68(17.8)	65(17.0)	
	Normal	12(3.1)	82(21.5)	85(22.3)	
	Above normal	1(0.3)	27(7.1)	20(5.3)	
BMI-for-age	Underweight	6(1.6)	30(7.9)	37(9.7)	0.421
	Normal	13(3.4)	123(32.2)	90(23.6)	
	Overweight	3(0.8)	30(7.9)	46(12.0)	
	Obesity	1(0.3)	2(0.5)	1(0.3)	
*Dietary	Low	3(0.8)	16(4.2)	17(4.5)	0.522
Diversity Score					
	Medium	16(4.2)	144(37.7)	131(34.3)	
	High	4(1.0)	25(6.5)	26(6.8)	

* Low(< 3 food groups), Medium (4-6 food groups), High (7-9 food groups)

† Low workload (less than 35hrs/week), Normal workload (35-40hrs per week), Excess workload (more than 40hr per week)

CONCLUSION AND RECOMMENDATION:

Maternal workload is a significant determinant of stunting among preschool children in Nsukka metropolis. Interventions to improve the nutritional status of preschool children should include strategies to reduce maternal workload.

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Barriers and Enablers to Exclusive Breast feeding Practice among Mothers with Infants 0-6 months In Abeokuta South Local Government Area, Nigeria

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KEYWORDS: Anthropometric indices, maternal workload, under-five children, nutritional status.

BACKGROUND AND OBJECTIVES:

Poor infant and child feeding practices continue to impede child health, nutrition and development in Nigeria. Despite the well-known benefits of exclusive breastfeeding and plethora of interventions programs to encourage it, compliance among Nigerian women remains low. Presently, four of every five under-five children missed the benefits of exclusive breastfeeding (NPC/ORF, 2019). Studies have documented good breastfeeding knowledge, however, this did not result in optimal breastfeeding practices. Bridging exclusive breastfeeding knowledge-practice gap is critical to promote appropriate programming to contribute to Nigeria's efforts to achieve the global target for exclusive breastfeeding. This study was designed to assess the knowledge, attitude and practice of exclusive breastfeeding and explore the barriers and enablers of exclusive breastfeeding among mothers of infants 0-6 months in Abeokuta south local government area, Nigeria.

METHODOLOGY: Data were collected using a pretested, semi-structured, interviewer-administered questionnaire including socio-demographics, knowledge, attitude and practice of exclusive breastfeeding. A 20 –point scale was used to assess respondents' knowledge on exclusive breastfeeding and categorized as poor (≤ 10), fair ($> 10-15$), and good (> 15). Attitude to exclusive breastfeeding was assessed using an 8-point scale categorized as poor (≤ 4) and good (> 4) and practice was assessed using a 14-point scale classified as poor (≤ 7) and good (> 7). Quantitative data were analyzed using descriptive and inferential statistics at $p < 0.05$. In the qualitative phase, 25 in-depth interviews were conducted using adapted barrier analysis methodology including eight behavioral determinants: perceived susceptibility, perceived severity, perceived action efficacy, perceived self-efficacy, cues for action, perceived social acceptability, perception of divine will, and positive and negative attributes of the desired behavior. Interviews were recorded, transcribed verbatim and analyzed thematically.

RESULT: Age of the mother was 28.9 ± 5.3 years, 99.0% were married, 99.0% had at least primary education, 94.7% were working, 91.0% attended ante-natal clinic, 58.7% delivered in private hospital and 89.3% had normal delivery. Age of infants was 2.78 ± 1.0 months, 52.7% were female, and 35.3% were firstborn. Respondents with good and fair knowledge constituted 56.0% and 32.0%, respectively. Respondents with good attitude were 62% and 37.7% practiced exclusive breastfeeding. Only 29% had early initiation of breastfeeding, 81.3% gave colostrum, and 43.3% had introduced water to the infants. Major enablers of exclusive breastfeeding practice include self- preparedness, experience, approval, known health benefits, adequate access to food while key barriers included health issues, poor knowledge and skills, forgetfulness, opposition from family and friends.

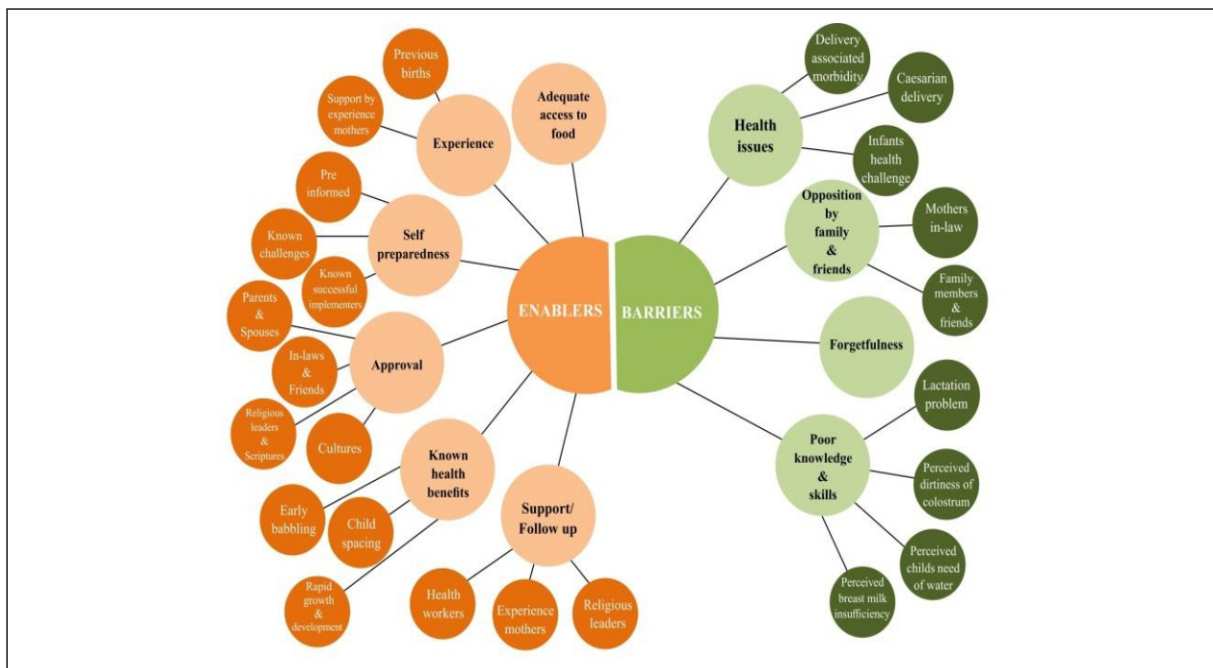


Figure 1: Enablers and barriers of exclusive breastfeeding among the respondents

CONCLUSION: Efforts to improve exclusive breastfeeding practice should incorporate innovative strategies to initiate preparation prior to delivery and mobilize community, religious and social supports for the nursing mothers to outwit barriers to exclusive breastfeeding practice.

Keywords: Exclusive breastfeeding, Barrier analysis, Enablers, Infants

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Effect of Storage method and Duration on Selected Biochemical Parameters and Microbiological Safety of Breast Milk from Working-class Nursing Mothers

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KEYWORDS: Cold chain storage, Exclusive breastfeeding, Lactoferrin, Pathogenic bacteria

BACKGROUND AND OBJECTIVE:

Breast milk is the major dietary source for infants [1]. At least six months of exclusive breastfeeding has been recommended because of the benefits to both infants and mothers [2]. However, in Nigeria, reports state that about 71% of Nigerian children are not exclusively breastfed [3], which results to cretinism, stunted growth and so on. Different factors contribute to the threat on exclusive breastfeeding in the nation. Expression of breast milk can assist in continuing exclusive breastfeeding; however, data reporting on nutritional composition and safety of stored expressed breast milk in Nigeria are limited. This study therefore aimed to provide evidence on the effect of storage method and duration on selected biochemical parameters and microbiological safety of expressed breast milk from working-class nursing mothers in Ikenne Local Government Area, Ogun State.

MATERIALS AND METHODS: Manually expressed breast milk samples were obtained from 15 volunteer working-class nursing mothers, each sample divided into three for storage at room temperature, in cold chain box (for four hours), and in a refrigerator (for eight days). Protein, lactoferrin and fat contents were determined spectrophotometrically and gravimetrically, while fatty acids were profiled by gas chromatography-mass spectrometry. Potentially pathogenic bacteria were isolated and identified by 16S rRNA sequencing.

RESULTS AND DISCUSSION: There were no significant changes ($p > 0.01$) in protein, lactoferrin and fat contents across all storage methods and durations. However, there was an increase in the fatty acid content of the milk across all storage methods. Thirteen potentially pathogenic bacterial species belonging to *Acinetobacter*, *Bacillus*, *Enterobacter*, *Staphylococcus*, *Klebsiella*, *Kosakonia*, *Pseudomonas* and *Serratia* genera were identified from the milk stored at room temperature and cold chain storage for four hours.

CONCLUSION AND RECOMMENDATION:

Overall, the biochemical parameters in the breast milk were retained under different storage method and durations; however, the microbiological data indicated the need for proper personal hygiene during the expression and storage of breast milk for the safety of infants. Refrigeration of hygienically expressed breast milk for up to eight days is recommended for working-class mothers in the study area.

Table 1: Effect of storage on total protein, lactoferrin and total fat contents of breast milk

Storage method/duration	Total protein (g/dL)	Lactoferrin (g/dL)	Total fat content (%)
Zero	0.86 ± 0.09 (0.74, 0.96) ^a	0.16 ± 0.02 (0.14, 0.19) ^a	2.36 ± 1.20 (1.25, 5.00) ^a
RT4	0.97 ± 0.12 (0.81, 1.10) ^a	0.12 ± 0.05 (0.08, 0.18) ^a	2.48 ± 1.64 (1.25, 6.50) ^a
CC4	0.83 ± 0.17 (0.50, 1.05) ^a	0.13 ± 0.07 (0.07, 0.23) ^a	3.07 ± 1.11 (1.75, 4.75) ^a
RF4	0.79 ± 0.20 (0.54, 1.04) ^a	0.11 ± 0.05 (0.09, 0.20) ^a	3.34 ± 1.14 (1.50, 5.00) ^a
RF8	0.76 ± 0.24 (0.49, 1.17) ^a	0.15 ± 0.05 (0.07, 0.23) ^a	3.27 ± 2.02 (1.25, 5.75) ^a

CONCLUSION AND RECOMMENDATION:

Overall, the biochemical parameters in the breast milk were retained under different storage method and durations; however, the microbiological data indicated the need for proper personal hygiene during the expression and storage of breast milk for the safety of infants. Refrigeration of hygienically expressed breast milk for up to eight days is recommended for working-class mothers in the study area.

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Effect of Behavior Change Communication and Reminder Strategies on Adherence to Iron-Folic Acid Supplementation Among Pregnant Women in Kano

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KEYWORDS: Iron-folic acid supplementation, anaemia, reminder, adherence

BACKGROUND AND OBJECTIVE:

Anaemia in pregnancy is a public health problem particularly in Nigeria [1]. Iron-folic acid supplements (IFAS) are currently provided free to pregnant women in Kano State during antenatal care (ANC). However, adherence remains low over the years [2]. This study assessed the effectiveness of behaviour change communication and reminder as strategies to improve adherence to IFAS supplementation in Kano.

MATERIALS AND METHODS:

Pregnant women (n = 143) were assigned to one of four cluster randomized intervention groups for three months as follows:

Group	Group Name	IFAS	Intervention Given		
			BCC	Reminder to	Reminder to Husband
I (n=44)	Intervention I	Yes	Yes	Woman	No
II (n=60)	Intervention II	Yes	Yes	Yes	Yes
III (n=20)	Information	No	Yes	No	No
IV (n=19)	Control	No	No	No	No

Haemoglobin concentration was measured before and after intervention. IFAS pill counts ≥ 90 were recorded as "adhered" at the end of the interventions and otherwise as "not adhered".

RESULTS AND DISCUSSION:

Results (Table 1) showed that intervention group II resulted in the highest adherence (81.7%) to IFAS intake and showed significant ($p=0.000$) increase in haemoglobin level when compared with control group using Tukey's HSD Post Hoc test. This suggest that involvement of husbands could be a good strategy to improve adherence to IFAS. This agrees with previous studies [3, 4] which linked involvement of husbands to a variety of favourable maternal health outcomes, including reduced postpartum depression, increased use of health-care services and higher rates of competent delivery attendance. Alternative tactics are required to guarantee that women and their families are aware of the necessity of supplements and that they remember to take it [5].

Table 1: Level of Adherence within interval of study and relationship with change in haemoglobin concentration

Group Name	Adherence Level		% Adherence	Mean difference in [Hb] (95% CI)	P-Value
	Adhered (≥ 90)	Not Adhered (<90)			
Intervention I (n=44)	32	12	72.7	0.329(-0.346-0.995)	0.569
Intervention II (n=60)	49	11	81.7	1.049(0.428-1.669)	0.000*
Information (n=20)	11	9	55.0	0.115(-0.755-0.985)	0.986
Control (n=19)	7	12	36.8	Reference	

Tukey's HSD Post Hoc test was used; * mean significantly different compared to control.
Hb = Haemoglobin Concentration

CONCLUSION AND RECOMMENDATION

Based on the findings of this study, IFAS education and reminder (especially involving husband) could be introduced as strategies to improve adherence to IFAS among pregnant women thereby contributing to the reduction of anaemia in pregnancy. Development of policy to mainstream husbands' involvement in routine maternal healthcare for better outcomes is strongly recommended.

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Prevalence and Determinants of Stunting among 2-5 year-old children in communities in Abia State, Nigeria

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KEYWORDS: Malnutrition, Stunting, children, sociodemographic

BACKGROUND AND OBJECTIVE:

Stunting remains a global public health problem and is associated with reduced physical and cognitive development, which can have serious long-term effects (1). In Nigeria, the prevalence of stunting is 32% and is as high as 60% and 20% in northern and southern Nigeria, respectively (2). The United Nations Sustainable Development Goal (SDG 2) have marked stunting along with other nutritional indicators as the main focus areas to eradicate global malnutrition (1). In order to tackle stunting, it is important to understand and be able to interpret the prevalence and causes of stunting based on our local context. This study therefore aimed to assess the prevalence of stunting and its determinants among 2-5-year-old children in selected urban and rural communities of Abia State, Nigeria.

METHODS: A community-based cross-sectional study was carried out among 688 mother/caregiver and child pairs selected from communities in three Local Government Areas in Abia State using multi-stage sampling technique. Mothers/caregivers socio-demographics and child characteristics were collected using an interviewer administered structured questionnaire. Height and weight were measured following standard procedures. WHO Anthro software was used to calculate the Z scores from anthropometric measurements. Stunting was defined as height-for-age Z scores less than two standard deviations from the median of the World Health Organization reference population. Bivariate and multivariate logistics regression were used to identify factors associated with stunting at p-value of 0.05

RESULT: The results revealed stunting prevalence of 22.7%, of this, about 13% and 10% were moderately and severely stunted, respectively. The odd of stunting was higher for female (AOR=1.71:1.35 - 2.17) than male children. Older children (4-5 years) (AOR=1.71:1.35 - 2.17) were at significantly higher risk of stunting compared to younger (2-3 years) children. Maternal factors associated with child stunting are income and place of residence. Children from rural areas were three times more likely to experience stunting compared to those residing in urban areas (AOR=1.71:1.35 - 2.17). Likewise, mothers who earned more than N50,000 per month had higher odds of having stunted children compared to those earning less than N50,000/month (AOR=1.71:1.35 - 2.17).

CONCLUSION: The findings revealed that maternal and child factors were associated with stunting.

This underscores the need for targeted policies and programs aimed at improving maternal characteristics for optimal nutritional status of children in the study area.

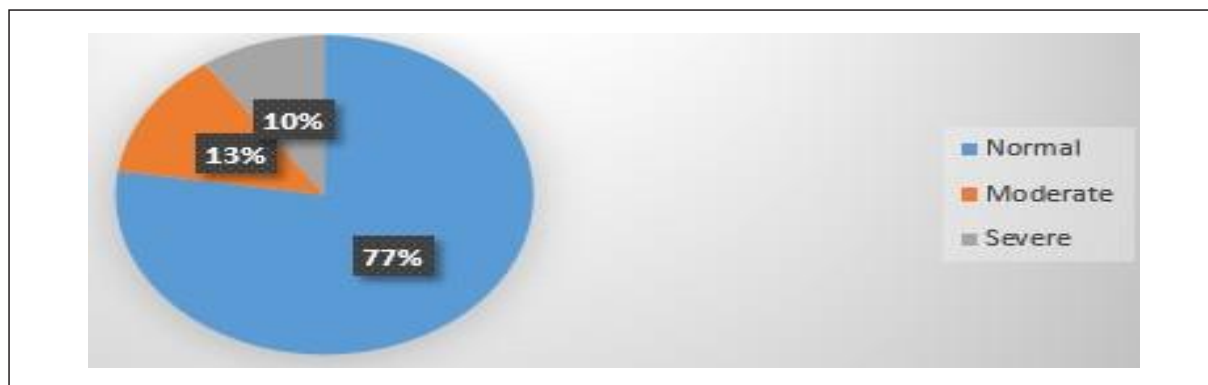


Figure 1 Prevalence of stunting

Table 1: Maternal and Child factors associated with stunting among children 2 to 5 years

Variables	Stunting		Multivariate AOR (95% CI)
	No (%)	Yes (%)	
Place of residence			
Urban	392 (73.8)	139 (26.2)*	Ref
Rural	140 (89.2)	17 (10.8)	3.43 (1.93 – 6.11)*
Sex			
Male	256 (74.2)	89 (25.8)*	Ref
Female	276 (80.5)	67 (19.5)	1.45 (0.99 – 2.10)*
Age (years)			
2-3	207 (71.1)	84 (28.9)*	Ref
4-5	325 (81.9)	72 (18.1)	1.51 (1.02 – 2.24)*
Income			
N30,000-N50,000	493 (77.4)	144 (22.6)*	Ref
>N50,000	3 (37.5)	5 (62.5)	1.76 (1.15 – 2.69)*

*significant at $p < 0.05$), OR= crude odd ratio, AOR= Adjusted odd ratio, CI= confidence interval, EBF= Exclusive Breastfeeding

CONCLUSION: The findings revealed that maternal and child factors were associated with stunting. This underscores the need for targeted policies and programs aimed at improving maternal characteristics for optimal nutritional status of children in the study area.

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Compliance to the National Regulations on the Marketing of Infant and Young Children Foods and Other Designated Products in Tertiary Health Facilities in Ibadan, Oyo State, Nigeria

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KEYWORDS: BMS Code, Infant formula, Compliance, Health Workers

BACKGROUND AND OBJECTIVE:

Despite decades of its existence, the enforcement of the International Code of Marketing of Breast Milk Substitutes remains relatively poor in Nigeria¹. This study was designed to assess the awareness and level of compliance with Nigeria's National regulations on the marketing of infant and young children foods and other designated products by the health workers in selected tertiary health facilities in Ibadan, Oyo state.

MATERIALS AND METHOD: This was a cross-sectional study among 29 health workers in two tertiary health facilities in Ibadan. A pre-tested self-administered questionnaire was used to elicit the health workers knowledge and compliance to the national regulations. Qualitative data was obtained through Key Informant interviews conducted with senior level and hospital management officials. Also, an observational compliance checklist was used to evaluate compliance at the facility level. The quantitative data was analysed using SPSS/IBM software version 21.0 while the qualitative interviews were recorded, transcribed verbatim and analysed thematically using NVIVO 12.

RESULTS AND DISCUSSION: Less than half (41.4%) of the health workers heard about the new National Regulations on the marketing of breast milk substitutes and 55% were not aware of their responsibilities as health workers under the national regulations. Overall, 34.5% of the health workers had adequate knowledge of the national regulations and only 21% had higher compliance with the national regulations. Furthermore, 31% of the health workers were of the opinion that their health facilities had a high level of compliance with the regulations. The observational assessment revealed that none of the tertiary health facilities displayed breastmilk substitutes, posters promoting BMS or any other related products. Also, none of the health facilities had a copy of the national regulations. It was further revealed that none of the health facilities had measures in place to check for violations of the national regulations by the health workers at the facility level. The qualitative findings further affirm the lack of written policy statements or documents including the regulations at the facility level and lack of awareness on the existence of the regulations. Health workers involved in maternal and child care are vaguely aware of the existence of the national regulation and their responsibilities as stated in the national regulations, therefore, the violation is unavoidable and consequently suboptimum IYCF practices.

CONCLUSION AND RECOMMENDATION(S):

The level of knowledge and compliance to the National Regulations at the tertiary hospitals in Ibadan was low. Urgent attention should be given to ensuring proper dissemination, sensitization and training of health workers and other stakeholders in the enforcement of the new national regulations on the marketing of infant and young children foods and other designated products in Nigeria.

Table 1: Knowledge and Compliance to the National Regulations on Marketing of Breast Milk Substitutes

Variables	Frequency	Percentage
Health workers knowledge of the national regulations		
Good	10	34.5
Poor	19	65.5
Health workers level of compliance to the national regulations		
High	6	20.7
Low	23	79.3
Health worker's view of facility compliance to the national regulations		
High	9	31.0
Low	20	69.0
Total	100	100

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OA37

Stress Associated Factors Limiting Breastfeeding Practices Among Working-Class Nursing Mothers In Lagos State, Nigeria

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KEYWORDS:

BACKGROUND AND OBJECTIVES:

Stress reduces human productivity and nursing mothers are not exempted of its impacts which could lead to poor and suboptimal breastfeeding practices, poor maternal care and childhood malnutrition (1). This study assessed level of maternal stress and its associated factors which limit breastfeeding practices among working-class nursing mothers in Lagos State, Nigeria.

MATERIALS AND METHOD This cross sectional study was conducted among 200 randomly selected mothers. Information on socio-demographic characteristics and breastfeeding practices was obtained by a well-structured questionnaire. International Stress Management Questionnaire was used to measure stress level. Body Mass Index (kg/m²) was calculated. Data was analyzed by SPSS version 21.0. Mean, frequency and standard deviation were measured. Association of variables was defined by chi-square at p<0.05.

RESULTS AND DISCUSSION

More than half (60.5%) of respondents were within age of 26-30 years, 60% were Yoruba, only 50% had tertiary education, 46.0% were civil servants, 78% worked in private sector, 88% were married while 12.0% were single mothers; 90% had monogamous homes and 55.5% earned 61-80,000 naira monthly, 97.5% and 3.0% were moderately and highly stressed respectively. Respondents having normal body weight and overweight were 30.0% each while obesity was 39.4%. Only 26.5% stayed at home (5-6 months) for maternity leave, 82.5% nursed either 2nd and 3rd child, 17.5% nursed first child, 44.0% started daycare within 5 months of age and only 21.0% practiced exclusive breastfeeding. Table 1 presents factors associated with maternal stress. This affirms previous studies which identified social and environmental factors such as maternal health problems and demand of mothers' work as constraints to optimal breastfeeding practices in Southwest Nigeria (2). Family and work responsibilities coupled with care for the infants place immense burdens on mothers and influence their physical and mental health (3).

CONCLUSION AND RECOMMENDATION

Poor breastfeeding practice among working-class nursing mothers in Lagos State, Nigeria is related to stress and it contributes to low exclusive breastfeeding, early enrolment of infants to daycare and early introduction of infant formula. Implementation of policy on 6 months maternity leave for public service workers needs regulation in Nigeria. Education on infant and young child feeding practice needs to be promoted to minimize maternal stress.

Table 1. Association of Maternal Stress with Socio-demographic Characteristics

Variables	Stress			λ^2	P value
	Moderate	High	Total		
	194(97.0%)	6(3.0%)	200(100.0%)		
Duration of maternity leave					
≤1month	31(15.5)	0(0.0)	31(15.5)	9.675	0.022*
2months	72(36.0)	6(3.0)	108(39.0)		
3-4months	38(19.0)	0(0.0)	38(19.0)		
5-6months	53(26.5)	0(0.0)	53(26.5)		
Age child started day-care or being given to caregiver					
2-3months	29(14.5)	0(0.0)	29(14.5)	14.782	0.002*
4-5months	53(26.5)	6(3.0)	59(29.5)		
6-7months	106(53.0)	0(0.0)	106(53.0)		
Others	6(3.0)	0(0.0)	6(3.0)		
Child has started taking infant formula					
Yes					
No	115(57.5)	6(3.0)	121(60.5)		
Duration of exclusively breastfeeding before introducing formula					
2-3months	66(33.0)	0(0.0)	66(33.0)	23.370	<0.001*
4-5months	92(46.0)	0(0.0)	92(46.0)		
6month	36(18.0)	6(3.0)	42(21.0)		

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OA38

Infant and Young Child Feeding and Diarrhea Disease among Children (0-24 months) at Jos University Teaching Hospital (JUTH), Family Health Clinic, Lamingo Jos.

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KEYWORDS: Diarrhea Disease, Infant Feeding Practices, Early initiation of breastfeeding, Prolactal feeding

BACKGROUND AND OBJECTIVES:

Diarrhea morbidity and mortality is more challenging in northern Nigeria where optimal infant feeding practices and other determinant factors are lacking (Ogbo et al.,2017). Very few studies have investigated the relationship between feeding practices and diarrhea in children in Nigeria and most importantly in northern part of the country using primary data. Therefore, this study was implemented to fill this gap. The main aim of this study was to determine Infant and Young Child Feeding (IYCF) practices and diarrhea disease among mothers of children (0-24 months) at JUTH

MATERIALS AND METHOD: The materials used for this survey were questionnaire, weighing scale, tape rule and length board. The study was a descriptive cross-sectional survey. A total of 400 mother-child pair attending the JUTH family health clinic for child's growth monitoring and immunization were interviewed. Data were collected and analyzed using descriptive statistics, chi-square and logistic regression tests at 5% level of significance.

RESULTS AND DISCUSSION: The prevalence of diarrhea among the children of the respondent was 19.8%, exclusive breastfeeding rate was 33.3%; 66.3% of the mothers-initiated breastfeeding within an hour of birth as recommended, 30% had practiced prelacteal feeding, 26.8% practiced bottle feeding and

only 38.9% did appropriate complementary feeding. More than half of the respondents had poor knowledge of IYCF. There was a statistical significance association ($P < 0.005$) between diarrhea and exclusive breastfeeding, breastfeeding initiation, prelacteal feeding, bottle feeding, complementary feeding, meal frequency, timely introduction of complementary feeding and IYCF knowledge. Almost half of the respondents reported that their children have ever experienced diarrhea. Diarrhea prevalence was lower among children whose mother practiced early initiation of breastfeeding, exclusive breastfeeding and those who introduced complementary feed at six months but higher among mothers, who initiated breastfeeding late, did not breastfeed exclusively, practiced prelacteal feeding, and introduced complementary foods either too early or too late. **Conclusion and Recommendation (s):**

Feeding practices is an important predictor of diarrhea among children (0-24 months) in Nigeria. Matters relating to infant and young child feeding and diarrhea disease management and prevention need to be integrated into major nutrition related programs across the country to help reduce the impact on child morbidity and mortality.

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Knowledge, Attitude and Practices of Exclusive Breastfeeding Among Civil Servant Mothers in Odeda Local Government Area of Ogun State, Nigeria.

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KEYWORDS: Knowledge, Attitude, Practices and Exclusive Breastfeeding.

BACKGROUND AND OBJECTIVES:

According to the World Health Organization, exclusive breastfeeding (EBF) is a way of breastfeeding a baby exclusively with only breast milk for the first six months of life. It is also a way to nourish a baby with breast milk from the mother without any liquid or food substances for the first six months of life. It promotes healthy growth and development and improves child's immunity. This study assesses the knowledge, attitude and practices of exclusive breastfeeding among civil servant mothers in Odeda Local Government Area of Ogun State, Nigeria.

MATERIALS AND METHOD: This study was cross-sectional and descriptive, with a sample size of 370. Four wards were randomly selected by balloting out of the 10 wards in Odeda Local Government, and the respondents were randomly selected within these four wards. A structured questionnaire was used to assess the socio-economic and demographic characteristics. An adapted questionnaire from Food and Agriculture Organization Knowledge, Attitude and Practices Questionnaire (FAO KAP) was used to assess the respondent's knowledge, attitude and practices towards exclusive breastfeeding. Data gotten was analyzed using SPSS.

RESULTS AND DISCUSSION: Table 1 revealed that majority (98.4%) of the respondents had good knowledge, 90.3% had good practices, while 54.3% had good attitude of EBF. A significant association (P -value ≤ 0.05) was observed between religion, family structure, level of education, monthly income and knowledge of EBF (Table 2). This finding agreed with the study of (1) which reported that about 80% of the respondents had good knowledge of exclusive breastfeeding.

Table 1: Knowledge, Attitude and Practices Scores of the Respondents

Variables	Poor		Fair		Good		Total	
	F	%	F	%	F	%	F	%
Knowledge	0	0.0	6	1.6	364	98.4	370	100.0
Attitude	47	12.7	122	33.0	201	54.3	370	100.0
Practices	3	0.8	33	8.9	334	90.3	370	100.0

Variables	Score						χ^2	P-value
	Fair		Good		Total			
	F	%	F	%	F	%		
Age (Years)								
15-49	4	1.1	315	85.1	319	86.2	1.961	0.161
50-60	2	0.5	49	13.2	51	13.8		
Religion								
Christianity	3	0.8	261	70.5	264	71.4		
Islam	2	0.5	100	27.0	102	27.6	14.167	0.001
Others	1	0.3	3	0.8	4	1.1		
Family structure								
Monogamy	2	0.5	331	89.5	333	90.0		
Polygamy	3	0.8	31	8.4	34	9.2	32.141	0.000
Others	1	0.3	2	0.5	3	0.8		
Marital status								
Married	6	1.6	346	93.5	352	95.1		
Single	0	0.0	1	0.3	1	0.3		
Divorced	0	0.0	12	3.2	12	3.2	0.312	0.958
Widowed	0	0.0	5	1.4	5	1.4		
Level of education								
SSCE	0	0.0	1	0.3	1	0.3		
ND	1	0.3	8	2.2	9	2.4		
NCE	2	0.5	22	5.9	24	6.5		
HND	1	0.3	30	8.1	31	8.4	16.814	0.019
B.Sc.	1	0.3	181	48.9	182	49.2		
M.Sc.	0	0.0	72	19.5	72	19.5		
PhD	0	0.0	31	8.4	31	8.4		
Others	1	0.3	19	5.1	20	5.4		
Monthly Income								
Less than N29999	1	0.3	3	0.8	4	1.1		
N30000-59999	2	0.5	20	5.4	22	5.9		
N60000-89999	1	0.3	57	15.4	58	15.7	22.946	0.000
N90000-119999	1	0.3	163	44.1	164	44.3		
N120000 and above	1	0.3	121	32.7	122	33.0		

CONCLUSION: Key factors contributing to positive knowledge, attitude and practices of EBF were identified as religion, family structure, education level and monthly income.

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Performance Assessment of Management of Severe Acute Malnutrition in Under-Five Inpatients in Selected Hospitals in Ibadan, Oyo State.

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KEYWORDS: Performance assessment, Severe Acute Malnutrition, Recommended guidelines, Under-five Children.

BACKGROUND AND OBJECTIVES:

Globally, severe acute malnutrition (SAM) is reported as the direct cause of an estimated 540,000 child deaths/year and an important underlying contributor to many under-five deaths (1). The Federal Ministry of Health of Nigeria and WHO indicates that, by complying with their inpatient management guidelines, less than 10% of children with complicated severe acute malnutrition is likely to die (2,3). However, despite reported compliance with these guidelines, mortality rates of 10–40% is being reported among severely malnourished under-5 inpatients (4). Hence, this study assessed the management of severe acute malnutrition in under-five inpatients in selected hospitals in Ibadan in line with the guidelines.

MATERIALS AND METHOD: A descriptive cross-sectional design was adopted. A total of 36 healthcare professionals comprising of Pediatricians, Dieticians and Nurses were selected from University College Hospital (UCH) and Oni Memorial Children's Hospital (OMCH) using the convenience sampling method to assess the inputs, process and outcome components of SAM management. Data was collected using a semi-structured, self-administered questionnaire. An observation checklist consisting of 15 items was used to evaluate the organizational facilities. Data was analyzed using the Donabedian Model and Hubinon quality of care rating and assessment scale(5).

RESULT AND DISCUSSION: It was observed that UCH and OMCH had an input score of 11(61%) and 10(56%) respectively which showed average input appraisal. The process appraisal for both hospitals were poor as shown by an observed score of 6(40%) for UCH and 4(27%) for OMCH. The outcome appraisal for UCH was good with an observed score of 5(100%) while that of OMCH was inconclusive due to poor record keeping in the facility.

CONCLUSION AND RECOMMENDATION: The overall quality of management of severe acute malnutrition in University College Hospital was observed to be average at 58% while that of Oni Memorial Children's Hospital was inconclusive due to poor record keeping. The components of good record keeping, availability of therapeutic foods and periodic training of staff on the recommended management guidelines needs to be improved

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Double Burden of Malnutrition among Mother-Child Pairs in Ibadan South West Local Government Area, Oyo State, Nigeria

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KEYWORDS: Overnutrition, Undernutrition, Body Mass Index, Mother-Child pairs

BACKGROUND AND OBJECTIVES:

: Double Burden of Malnutrition (DBM), the co-existence of undernutrition and overnutrition among individuals, households and populations, often manifest itself as a life-cycle problem(1). In Ibadan South West Local Government Area (LGA), the prevalence of different social classes co-exist with high burden of malnutrition. This study was therefore designed to determine the magnitude of double burden of malnutrition among mother-child pairs in Ibadan South West LGA, Oyo State.

MATERIALS AND METHOD: This cross-sectional study employed three-stage sampling procedures to select three communities (high, medium and low densities), 393 households and 393 mother-child pairs. A pre-tested interviewer-administered questionnaire was used to obtain data on socio-economic characteristics and anthropometric characteristics. Weight and height of children were assessed and analysed using WHO Anthro software to generate z-scores, classified as stunting, wasting and underweight ($\leq -2S.D$). Body Mass Index (BMI) of mothers was categorized as underweight (<18.5), normal (18.5-24.9), overweight (25.0-29.9) and obese (≥ 30) kg/m² respectively. The DBM was defined as Stunted Child/Overweight Mother (SCOVm), Stunted Child/Obese Mother (SCOBm), Wasted Child/Overweight Mother (WCOVM), Wasted Child/Obese Mother (WCOBM), Underweight

Child/Overweight Mother (UCOVM), Underweight Child/Obese Mother (UCOBM) and Overweight Child/Underweight Mother (OCUWM). Data were analysed using descriptive statistics and Chi-square test.

RESULTS AND DISCUSSION: Ages of children and mothers were 20.0 ± 15.9 months and 30.8 ± 6.7 years respectively. Mothers were mostly artisans (30.0%) and traders (26.5%) while 52.2% had completed secondary education. Prevalence of child stunting, wasting and underweight were 32.1%, 3.8% and 10.9% respectively. Prevalence of underweight, overweight and obesity among mothers was 7.2%, 26.0% and 13.3% respectively. A similar study in Nigeria had reported that the prevalence of stunting, wasting, underweight of children as 37.4%, 13.2%, 23.2% respectively while underweight, overweight and obese in women were 9.0%, 23.2% and 9.3% respectively (2). Overall DBM prevalence was 20.6%, with the highest prevalence in the low density community (13.0%). Predominant DBM was SCOVM (8.4%).

Table 1: Double burden of malnutrition in households and Population density

Forms of DBM	High density	Medium density	Low density	Total	P
Stunted child/ Overweight mother	7(1.8)	16(4.1)	32(8.1)	55(14.0)	.025
Stunted child/ Obese mother	4(1.0)	3(0.8)	8(2.0)	15(3.8)	.004
Wasted child / Overweight mother	1(0.3)	1(0.3)	0(0)	2(0.5)	.002
Wasted child/Obese mother	1(0.3)	1(0.3)	0(0)	2(0.5)	.011
Underweight child/overweight mother	1(0.3)	2(0.5)	7(1.8)	10(2.5)	.010
Underweight child/ Obese mother	1(0.3)	2(0.5)	4(1.0)	7(1.8)	.042
Overweight child/ Underweight mother	1(0.3)	2(0.5)	3(0.8)	6(1.5)	.003
Overall	13(3.3)	22(5.6)	46(11.7)	81(20.6)	

CONCLUSION AND RECOMMENDATION:

There was a high prevalence of the DBM among mother-child pairs in Ibadan South West Local Government Area. Corrective nutrition education is therefore recommended to achieve significant reduction in the prevalence of the DBM.

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Assessment of the Iodine Status of Women of Reproductive (15-49 years) Age in Rivers State

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KEYWORDS: Women; Reproductive age; Urinary Iodine Concentration; Iodine Deficiency

BACKGROUND AND OBJECTIVES:

Iodine deficiency disorders (IDD) is a global public health problem. It is one of the oldest and most insidious of human health problem. Globally, nearly 2 billion people suffer from IDD with around 50 million having clinical manifestations [1]. Iodine deficiency not only causes goiters, but may also result in irreversible brain damage and retard psychomotor development in children. Deficiency of essential micronutrients, including iodine, has substantial impacts on the health and development of growing children. Iodine intake remains an issue for women of childbearing age. While it is essential for women to consume adequate levels of iodine during pregnancy, it is equally important that women of childbearing age consume sufficient amounts of iodine, especially those who are planning a pregnancy. According to recent studies, a better thyroid profile has been observed among pregnant women who had regular adequate iodine intake before they became pregnant than women who began iodine supplementation upon becoming pregnant [2]. Because the first trimester is a critical period for sufficient thyroid hormone levels and most pregnancies are unplanned, it is important for women of childbearing age to consume an adequate amount of iodine, corresponding to the recommended iodine intake of 150 µg/day. Therefore, the aim of this study is to assess the iodine status of women of reproductive (15-59) age in Rivers State. A better understanding about the iodine status in the targeted population could enlighten the health authorities and policymakers regarding the magnitude of iodine deficiency and may possibly support the development of appropriate policies regarding the screening and prevention of iodine inadequacy during pregnancy.

MATERIALS AND METHODS: A cross sectional study design and experimental design was used for the study. The area of this study is Rivers State, Nigeria. Rivers State is one of the 36 states of Nigeria, located in the heart of the Niger Delta region of the country. The population for the study comprised of all female senior secondary students and teachers between 15-49 years in the three senatorial zones of Rivers State. The minimum sample size required for the study was 320 women estimated using the Cochran formula.

$$No = \frac{z^2 pq}{d^2}$$

A multistage sampling procedure was used in the selection of the sample. The first stage was to purposively select one school from the three senatorial zones in Rivers State. A total of 330 pupils aged 6 months-5 years old were recruited for the study. A semi-structured questionnaire was used to obtain relevant history and

socio-demographic information from the participants. Ten millilitre (10 ml) of Spot urine samples were collected from the pupils into clean universal bottles with the lid tightly screwed and transported in ice-packs to the Chemical Pathology Laboratory of the Department of Medical Laboratory Science, Rivers State University where they were kept in the refrigerator at 2-8 °C till analysis. Samples were pooled and analyzed in batches. Urinary iodine was tested using the Sandell-Kolt-koff method as described by World Health Organization (2013). Ethical clearance was obtained from the Rivers State Ministry of Education. Approval was sought from Head Teachers of the selected schools. The data from the study was coded and keyed into the computer, then analyzed using the Statistical Package for the Social Sciences (SPSS) version 12 computer software.

RESULTS AND DISCUSSION: Table 1 shows the iodine nutrition status of pre-school age in Rivers State. The median urinary iodine concentration of the study population (129.06 µg/L) indicated that the women had optimal iodine nutrition. It is known that an insufficient supply of thyroid hormone to the developing brain results in neurocognitive impairment [4]. This may correspond to the fetal development phase, which happens between the first and second trimesters of pregnancy. Therefore, the children of iodine-deficient mothers are at a higher risk of diminished cognition. Thus, ensuring optimal and adequate iodine intake from the moment a woman plans to become pregnant is particularly important for preventing adverse effects in their offspring, because even slightly low maternal thyroid hormone levels during pregnancy can cause cognitive delays in their offspring. The percentage of urinary iodine concentration (UIC) below 50 µg/L in the women (2.60%) indicated that iodine deficiency among childbearing-age women has not yet been eliminated. Majority of the women (44.16%) were more than adequate while 6.49% were excessive. In non-pregnant women, median UIC between 100 and 299 µg/L defines a population which has no iodine deficiency. In addition, not more than 20% of samples should have a UIC below 50 µg/L. This UIC of 100–199 µg/L corresponds approximately to a daily iodine intake of 150 µg/day for adults, which includes non-pregnant women [5].

Table 1: Distribution of urinary iodine concentration among women of child bearing age women (15-49 years)

Baseline	Iodine Intake	Iodine nutrition	Frequency (N)	Percentage (%)
<20	Insufficient	Severe iodine deficiency	0	0
20-49	Insufficient	Moderate iodine deficiency	8	2.60
50-99	Insufficient	Mild iodine deficiency	50	15.58
100-99	Adequate	Optimal	100	31.17
200-199	Excessive	Risk of iodine induced by hyperthyroidism iodine deficiency	141	44.16
>300	Excessive	Risk of adverse health consequences	21	6.49
Total			N=320	100

CONCLUSION AND RECOMMENDATIONS

The iodine status of the women showed that majority of the women had excessive iodine levels and may be at risk of iodine induced hyperthyroidism. Public awareness regarding the magnitude of iodine deficiency in women of reproductive age is therefore recommended.

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Anthropometric measurements and Socio-economic status of pregnant women in Ondo State Specialist Hospital, Nigeria.

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KEYWORDS: Pregnant women, Anthropometric, Socioeconomic, meal consumption.

BACKGROUND AND OBJECTIVES:

Pregnant women are commonly known as vulnerable members of the society. In order to successfully nourish the developing fetus, sufficient consumption of nourishing foods is necessary. Adequate diets during pregnancy prevent negative pregnancy outcomes. The purpose of this study was to evaluate the anthropometric and socioeconomic variables that affect pregnant women's eating choices in Akure, Ondo State.

MATERIALS AND METHOD: The study was carried out in Ondo State Specialist Hospital, Nigeria. Pregnant women ($n=120$) were randomly selected from the antenatal clinic population. Data on socioeconomic and frequency of meal consumption were obtained through pre-tested questionnaire and were analysed using descriptive statistics. Weight and height were measured according to WHO standards, and trimester-mean values were calculated.

RESULTS AND DISCUSSION: According to Table 1's breakdown of pregnant women by age, there were 3.3, 70, and 26.7% of women who were under 20, between 20 and 30, between 31 and 40 years old and none was above 40 years. Most women get married and pregnant between 20 – 30 years of age this might be the reason why 70% of the volunteers were in this age group. Nigeria is cultural aberration as marriage/pregnancy is not meant for immature minds (1). Also, the mean BMI of the volunteers in the first, second and third trimesters were 23.57, 29.52 and 30.00kg/m² respectively. The majority of pregnant women (53.33 %) had tertiary education and 30% were civil servants. 50% of the participants earned less than N8,000 per month. Table 2 showed that about 30% of the pregnant women ate twice a day. Three square meals each day are the preferred approach to nourish the body and stay energized all day, especially when made with different vegetables and fruits, which contribute most efficiently to sound nutrition and health (2). 30% of pregnant women ate only twice a day, which may lead to nutrient insufficiency and poor

fetal and maternal growth. 83% of pregnant women ate snacks, possibly because they like to chew or keep their mouths active. Poor preconception and pregnancy diet can cause intrauterine growth retardation (3).

Table 1: Distribution of Pregnant Women by Age Grade

Age (Years)	N	Percentage (%)
<20	4	3.30
20 – 30	84	70.00
31 – 40	32	26.70
41 – 50	0	0.00
Total	30=120	100

Table 2: Frequency of Meal Consumption (Daily) by the Pregnant Women

	N	Percentage (%)
2 times	9	
3 times	5	16.70
> 3 times	6	20.00
Snacks	10	33.30

CONCLUSION: The use of visual tools to teach pregnant women about nutrition during antenatal clinics can help them improve and maintain a varied diet during pregnancy.

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Nutritional Composition and Sensory Evaluation of Complementary foods made from blends of yellow maize, white rice, soybeans, unripe banana and three different nuts.

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KEYWORDS: Complementary foods, nutritional composition, sensory evaluation, yellow maize

BACKGROUND AND OBJECTIVE:

Malnutrition in under five children remains a problem of public health in Nigeria. Poor complementary foods (CF) and the high cost of available CF are some of the associated causes of malnutrition. This study assessed the nutritional composition and sensory evaluation of CF made from blends of yellow maize, white rice, soybeans, unripe banana and three different nuts (almond, groundnuts, and cashew nuts).

MATERIALS AND METHODS: The purchased food items were prepared and processed into flour. Each staple (white rice or yellow maize) was blended with soybeans, unripe bananas, and each nut in the ratio 50:30:10:10 (Samples A – F). The nutritional composition of the CF blends was determined using AOAC methods and sensory evaluation was assessed on a 9-point hedonic scale. Data were analyzed with SPSS and ANOVA was used to test for mean differences at $\alpha_{0.05}$.

RESULTS AND DISCUSSION: Table 1 shows the nutritional composition of produced CFs and Table 2 shows the sensory evaluation and overall acceptability of CFs. Moisture, protein, fat, carbohydrate, and energy content ranged between 5.50%-9.43%, 14.32%-16.94%, 7.67%-1.33%, 61.74%-68.62% and 401.23-417.97kcal. Minerals (K=416.66-711.74, Ca=156.05-266.57, Fe=3.51-5.71mg/100g) and Vitamins (C=1.56-9.09, B2=0.2780-0.3119mg/100g) were within recommended requirements for children and similar with previous studies (1). Samples contain adequate protein and energy needed to meet the recommended daily nutrient and energy requirements (2,3). Sample F had the highest overall acceptability for appearance, taste, and color.

CONCLUSION AND RECOMMENDATIONS

This study showed that complementary foods produced can adequately meet the minimum nutrient requirements of infants and young children. Blends of these locally available foods are recommended as a suitable complementary food.

Table 1 : Nutritional composition of complementary foods made from blends of white rice, yellow maize, soybeans, unripe banana and three different nuts

Samples	Sample A	Sample B	Sample C	Sample D	Sample E	Sample F
Moisture (%)	9.43±0.12 ^d	8.60±0.36 ^c	8.60±0.17 ^c	6.50±0.00 ^b	6.33±0.29 ^b	5.50±0.50 ^a
Protein (%)	14.80±0.05 ^b	16.94±0.05 ^f	16.81±0.05 ^e	14.32±0.05 ^a	15.37±0.05 ^c	15.54±0.05
Fat (%)	7.67±0.58 ^a	8.67±0.58 ^{ab}	9.67±0.58 ^{bc}	8.67±0.58 ^{ab}	10.33±0.58 ^c	9.20±0.35 ^b
CHO (%)	66.80±0.21 ^c	63.87±1.03 ^b	61.74±0.49 ^a	68.62±0.36 ^d	65.88±0.53 ^c	65.90±0.85
Energy (kcal)	395.43	401.27	401.23	409.79	417.97	408.56
Iron*	4.58±0.10 ^{bc}	3.51±0.10 ^a	3.93±0.62 ^{ab}	4.22±0.41 ^{abc}	5.06±0.72 ^{cd}	5.71±0.54 ^d
Calcium*	187.46±2.01 ^b	189.79±0.00	156.05±2.01	157.22±2.01	261.92±4.03 ^c	266.57±3.49
Potassium	500.53±5.38 ^b	506.74±0.00	416.66±5.38	419.76±5.38	699.31±10.76	711.74±9.32
Vitamin C*	9.09±0.45 ^c	8.71±0.34 ^c	8.52±0.23 ^c	1.56±0.09 ^a	3.50±0.30 ^b	3.88±0.35 ^b
Vitamin B2*	0.29±0.013	0.30±0.013	0.31±0.001	0.28±0.015	0.28±0.038	0.30±0.015

* mg/100g. Results are presented as Mean±standard deviation. Means with same superscript in the same column are not significantly different (p>0.05) Sample A = 50% white rice; 30% soybeans;10% unripe banana; 10% almond nuts; sample B = 50% white rice;30% soybeans;10% unripe banana; 10% groundnuts; sample C = 50% white rice; 30% soybeans;10% unripe banana; 10% cashew nuts; sample D = 50% yellow maize; 30% soybeans;10% unripe banana; 10% almond nuts; sample E = 50% yellow maize; 30% soybeans;10% unripe banana; 10% groundnuts; sample F = 50% yellow maize; 30% soybeans;10% unripe banana; 10% cashew nuts

Table 2: Sensory Evaluation of Products

Product	Appearance	Colour	Aroma	Taste	Texture
	Mean	Mean	Mean	Mean	Mean
A	6.05	6.30	6.60	5.50	6.74
B	7.00	7.10	7.10	7.05	7.55
C	6.95	6.60	6.95	6.75	7.45
D	7.40	7.40	7.21	7.10	7.45
E	7.15	7.50	7.65	7.15	7.40
F	7.45	7.25	7.50	7.25	7.60
Overall acceptability	F, C, B	B, D, F	B, E, D	F, E, D	A, D, E

CONCLUSION AND RECOMMENDATIONS

This study showed that complementary foods produced can adequately meet the minimum nutrient requirements of infants and young children. Blends of these locally available foods are recommended as a suitable complementary food.

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Measuring Household Food Insecurity in Ido Local Government Area, Oyo State

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KEYWORDS: Food Insecurity, Household Food Insecurity Access Scale (HFIAS), Food access.

BACKGROUND AND OBJECTIVE:

Food security is defined as the access to adequate, safe and nutritious food required for healthy living by all people at all times. Adequate food intake is necessary for healthy life; however the existence of food security at national level does not translate into household food security [1]. This study was conducted to describe the food security status of under-five households in Ido Local Government Area, Ibadan, Oyo State.

MATERIALS AND METHOD: This study was cross-sectional in design with a sample size of 250 households with under-five children selected using random sampling techniques. An interviewer-administered questionnaire was used to collect data on the socio-demographic variables and factors contributing to household food insecurity from head of households. The prevalence of food insecurity was assessed using 9-item Household Food Insecurity Access Scale (HFIAS); the questions contained in the HFIAS were asked with a recall period of 12 months. Data were analyzed using SPSS (version 20) and presented as frequencies and percentages. Associations between variables were tested using Chi-square at 5% level of significance. The households were classified as food secured, mildly food insecure, moderately food insecure and severely food insecure.

RESULTS AND DISCUSSION: The results showed that the respondents had a mean age of 34.3 ± 8.2 years while less than half of them (40.5%) were aged 31-40 years. More than a third of the women (39.6%) had secondary education while 52.0% were artisans. Less than one-third of the respondents (26.0%) spent less than 20% of monthly income on food while 25.6% were food secure 28.4% as shown in Table 1. It has been reported that 33.8% of households were food secure among urban families in Lagos, Nigeria (2). Food secure households were statistically significantly associated with households with heads having higher education, good occupation and household size less than four ($P=0.002$, $P=0.000$ and $P=0.001$ respectively).

CONCLUSION AND RECOMMENDATION:

The study revealed a high level of household food insecurity which is an indicator of high poverty levels. There is therefore an urgent need for government to engage in the economic empowerment of women and improvement in food availability to improve the level of food security at household levels.

Table 1: Socio-demographic Characteristics and Food security status of respondents

Variables	Frequency (%) (N=250)
Educational status	
No formal education	35(14.0)
Primary	84(33.6)
Secondary	99(39.6)
Tertiary	32(12.8)
Occupation of head of household	
Unemployed	35(14.0)
Artisan/trader	130(52.0)
Civil-servant	64(25.6)
Professional	21(8.4)
Proportion of monthly income given as food allowance (%)	
Less than 20	65(26.0)
20-40	82(32.8)
41-80	71(28.4)
Greater than 80	32(12.8)
Household Size	
Less than 4	65(26.0)
4-6	120(48.0)
Greater than 6	65(26.0)
Household food security status	
Food Secure	64(25.6)
Mild Food insecure	71(28.4)
Moderate Food insecure	65(26.0)
Severely Food insecure	50(20.0)

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An Assessment of Nutritional Status And Feeding Pattern of Under- Five Children In Edo Central Senatorial District

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KEYWORDS: Assessment, Nutritional Status, Feeding Pattern, Under - Five.

BACKGROUND AND OBJECTIVE:

Globally, approximately 3 million children under the age of 5 die annually due to under-nutrition with 41 million under five children being overweight or obese as at 2014 (Okonkwo, 2018). Malnutrition is a significant public health problem and it is an important cause of morbidity and mortality in children below 5 years of age (Ozoka, 2018).

The study examined the relationship between nutritional status and feeding pattern of the under five children in Edo State.

MATERIALS AND METHODS: A descriptive cross-sectional study design was used with a sample size of 300 under-five children and their mothers. Questionnaire and instruments for anthropometric measurements were used to collect data using a convenience sampling technique. Section "A" of the questionnaire captures sociodemographic data of the mothers of under- five children while section "B" the nutritional status and feeding pattern of the under- five children. Tape for Mid Upper Arm Circumference (MUAC tape) and bathroom scale were used to collect data for the anthropometrics. Data collected were analyzed using Statistical Package for the Social Sciences (IBM SPSS) 22 Version.

RESULTS AND DISCUSSION: The mean (\pm SD) age of mothers was 29.5 years and the standard deviation (SD) 5.1. Out of the 300 children studied, 105 (35%) were malnourished, 195 (65%) were well nourished. Chronic malnutrition characterized by stunted growth was 35.2% (37) of the 105 malnourished under five children while 64.8% (68) presented with acute malnutrition which was characterized by low weight for height. Refusal to feed was 3.3% (10 under five children). Out of the 300 children, 0.7% feed once, 7.7% feeds twice, 30% feed thrice per day while 61.7% feed frequently. There was a significant statistical association on the mother's awareness of the relationship existing between nutritional status and feeding pattern of the under five children in Edo Central Senatorial District ($\chi^2 = 10.956$, $df = 1$, $P = 0.001$, $P < 0.05$).majority of the under five children have high percentages of normal and high appetite (24.7% and 57.3%) compare to low appetite and refusal to feed.

A close look at the distribution of the respondents' nutritional intake/appetite showed that 3.3% (10 under five children) refused feed. From the result obtained, the main challenge was micronutrient deficiencies related to intake of poor nutrient dense complementary feeds. Poverty and maternal level of awareness, educational status, number of under five children in the family, knowledge of the relationship between nutritional status and feeding pattern and significant nutrients among others affect the nutritional status and feeding pattern of the under five children in Edo Central Senatorial District.

CONCLUSION AND RECOMMENDATION: There is need to promote infant and young child feeding, including exclusive breastfeeding, adequate complementary feeding practices through the creation of

awareness of the importance and composition of adequate diet and complementary feeding practices. Recommendations: Provision of nutrition and health education by governmental, non-governmental health organizations and agencies. Subsidized medical care should be given to all poor mothers and their under five children in government hospitals. Introduction of school feeding programs in all public schools focusing on the principles of nutrient dense feeds and or snacks most especially in nursery and play classes where most under- five children are enrolled.

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Functional Properties Of Rice, Complemented With Pigeon Pea Protein Concentrate And Carrot Flour

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KEYWORDS: Functional properties, rice, pigeon pea protein concentrate, carrot flour

BACKGROUND AND OBJECTIVES:

The functional properties of complementary foods are the fundamental physico-chemical properties that reflect the complex interaction between the structure, molecular components, and composition of such food (1). The knowledge of the functional properties is very useful in new product development and its application in the preparation of complementary foods. Therefore, the study examined the functional properties of rice, complemented with pigeon pea protein concentrate and carrot flour.

MATERIALS AND METHOD:

Local rice, pigeon pea, carrots and commercial product were procured from Kure Ultra-Modern Market, Minna, Niger State. The pigeon pea seeds were cleaned and then soaked in distilled water for 6hrs, at ambient temperature. The water was changed every 2hrs to avert fermentation. The soaked pigeon pea were distributed on jute bags and allowed to germinate for 48hrs with sprinkling of water at intervals. The

germinated pigeon peas were dried using solar drier for 48h and then milled. The protein extraction was carried out as described by Chandi and Sogi (2007), with minor alterations. Functional properties were determined according to (Onwuka, 2018). The analyses were conducted in triplicates and data were subjected to one-way analysis of variance.

RESULTS AND DISCUSSION:

From the results obtained in table 1, the bulk density of the formulated blend varied from 0.26 to 0.73%. Blend A had the least bulk density. Diet of lower density is required for infants to allow them swallow it with ease without choking or suffocation (4). The water absorption capacity was significantly higher ($P < 0.05$) in blend D followed closely by blend C. Blend A with the highest rice content of 70% had the least WAC which could be attributed to the higher ratio of rice in the blend in comparison to other blend samples. Oil absorption capacity is an indication of the rate at which the protein binds to fat in food formulations. High OAC of flours suggests the presence of polar amino acids. The control had the best solubility index (74.05%) followed by blend C (7.02%) which was significantly higher ($P < 0.05$) than other blends. The higher the ratio of the carrot flour in the blend, the higher the solubility index. However, there was reduction in foaming capacity as the carrot content increased from 20 to 30% with blend A having the value of 8.92% which was significantly higher ($P < 0.05$) compared to other blends. Gelation capacity of the blends varied from 2.00 to 8.00g/cm³ with blend C significantly higher in value than other blends.

CONCLUSION AND RECOMMENDATION(S):

Blend C (60% rice flour, 10% pigeon pea protein concentrate and 30% carrot flour) has the fit functional properties for the formulated blends. There is a need to determine the blends storage stability (Shelf life).

Table 1. Functional properties of the formulated blends

Parameter	A	B	C	D
Bulk Density (g/ml)	0.68 ^b ±0.01	0.71 ^{ab} ±0.07	0.73 ^a ±0.07	0.26 ^c ±0.02
WAC	3.59 ^d ±0.01	3.69 ^c ±0.01	4.52 ^b ±0.02	5.82 ^a ±0.03
OAC	2.51 ^a ±0.02	1.82 ^c ±0.02	2.10 ^b ±0.14	2.52 ^a ±0.03
GC (%)	2.00 ^c ±0.01	2.00 ^c ±0.03	8.00 ^a ±0.01	6.00 ^b ±0.02
FC (%)	8.92 ^a ±0.01	3.42 ^b ±0.03	1.50 ^c ±0.02	0.63 ^d ±0.02
Solubility index (%)	5.02 ^d ±0.03	6.02 ^c ±0.03	7.02 ^b ±0.02	74.07 ^a ±0.03
Swelling Power	7.56 ^b ±0.01	7.67 ^a ±0.03	7.12 ^c ±0.02	6.43 ^d ±0.04

Values are means ± standard deviation of triplicate determination. Values in the same row with different superscripts are significantly different ($p \leq 0.05$).

KEYS

A= 70% rice flour, 10% pigeon pea protein concentrate and 20% carrot flour,
 B= 65% rice flour, 10% pigeon pea protein concentrate and 25% carrot flour,
 C= 60% rice flour, 10% pigeon pea protein concentrate and 30% carrot flour,
 D= Control (Commercial Product).

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Nutritional Status and Menstrual Irregularities among Adolescents in Ado-Ekiti

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KEYWORDS: Body Mass Index, Menstrual Irregularities, Adolescents, Menarche.

BACKGROUND AND OBJECTIVE:

Undernutrition can delay growth and maturation, which further increases the risks associated with adolescent reproductive disorders. Adolescents are a nutritionally vulnerable group due to their high energy and nutritional requirements for development (1) owing to periods of physical, emotional, social and physiological changes especially menstruation which poses the most challenges (2), while under-nutrition can delay growth and maturation, which further increases the risks associated with adolescent reproductive disorders (3). This study determined the relationship between dietary intake, nutritional status and menstrual irregularities among adolescents in Ado-Ekiti.

MATERIALS AND METHODS: Semi-structured questionnaires with sections requesting information about anthropometric data, dietary intake and menstrual irregularity was used. Two hundred and eighty three adolescents were assessed for the study. The data collected were analyzed using the statistical package for social sciences (SPSS) version 20 and expressed in frequency and percentage. Chi-square test was performed on the data at 5% level of significance.

RESULTS AND DISCUSSION: Effect of dietary intake and nutritional status on menstrual irregularities in adolescents was assessed. The result revealed 41% of the students had menarche between 10 and 12 years of age with 11 years as the mean age of menarche. The mean age in this study was however; lower when compared to a similar cross-sectional study reported by Waisu *et al* (4). The results revealed that both macronutrients and micronutrients intakes of the students do not have significant influence on the body mass index of the students. There was no statistical association ($P>0.05$) between BMI and menstrual rhythm ($P=0.188$), length of menstrual cycle ($P=0.857$), absence of menstruation for 3 months ($P=0.157$), dysmenorrhea ($P=0.956$) and severity of dysmenorrhea ($P=0.196$).

Table 1: BMI of the study participants (N=283)

BMI (Kg/m ²)	Frequency (N)	Percent (%)
severely underweight(16.0-17.0)	2	0.7
Underweight (17.0- 18.49)	17	6.0
Normal (18.50-24.49)	130	45.9
Overweight (25.0-30.00)	88	31.1
obese class I(30.0-34.49)	33	11.7
obese class II(35.0-40.0)	15	4.6

Table 2: Menstrual Irregularities and BMI (N=283)

BMI	< 25	%	>25	%	P value
Pre-menstruation					
Poor concentration, Withdrawal behavior	8	5.3	15	11.5	0.011
Irritability, fatigue	42	27.6	22	16.8	
Headache, backache	48	31.6	52	39.7	
Not applicable	27	17.8	30	22.9	
	27	17.8	12	9.2	
Length of menstrual cycle					
< 21days	58	38.2	54	41.2	0.857
21-35days	91	59.9	74	56.5	
>35days	3	2.0	3	2.3	
3 months since you saw your last period					
Yes	10	6.6	114	11.5	0.150
No	15	93.4	116	88.5	
Menstrual rhythm:					
Regular	81	53.3	71	61.1	0.188
Irregular	80	46.7	50	38.9	

CONCLUSION AND RECOMMENDATIONS:

The study has revealed that an association exists the between body mass index and premenstrual problems. However, an association between BMI and irregular menstrual cycle; oligomenorrhea, polymenorrhea and dysmenorrhea was not observed. Future research can focus on the association between body fat and menstruation by using a more detailed assessment of other pubertal changes.

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Use of Instagram-Based Breastfeeding Intervention to Improve Breastfeeding Knowledge and Intention of Young Adults in Nigeria

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KEYWORDS: Breastfeeding, Awareness, Social media, Engagement

BACKGROUND AND OBJECTIVE:

Breastfeeding intentions of future parents are greatly influenced by their current breastfeeding knowledge, hence, it is imperative to improve the breastfeeding knowledge of the young adults prior to parenthood (1-2). Despite the growth in social media engagement among the young adults, limited researches have leveraged on its potential to promote public health outcome especially breastfeeding promotion (3). This study therefore leveraged on Instagram, one of the leading social media platforms to improve the breastfeeding knowledge and intention of the young adults in Nigeria.

MATERIALS AND METHOD: This was a quasi-experimental study involving 150 (70 in the intervention group and 80 in the control group) young and active Instagram users. A baseline assessment of breastfeeding knowledge and intention was conducted after which participants were randomly selected into the intervention and control groups. Participants in the intervention group were engaged on Instagram through daily Instagram breastfeeding-based posts for three weeks as well as weekly Instagram live sessions, while participants in the control group were only exposed to daily posts related to fruits and vegetables. The baseline and endline assessments on the breastfeeding knowledge and intention of the participant in both groups were elicited through semi-structured self-administered questionnaire. The data was analysed using SPSS/IBM software version 20 and results were presented using descriptive and inferential statistics. McNemar test was used to investigate whether the relationship between the level of knowledge and intention of respondents in the intervention group was statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION: At baseline 7 out of 10 participants in both intervention and control groups had inadequate breastfeeding knowledge. At endline, the breastfeeding knowledge of the participants in the control group remained relatively the same, while the proportion of the young adults with adequate knowledge in the intervention group increased significantly from 30% to 64.3%. While the proportion of the participants with good breastfeeding intention dropped from 23.7% to 21.3% in the control group, the proportion in the intervention group increased from 32.9% to 61.4%. Changes in breastfeeding knowledge and breastfeeding intention among the intervention group were statistically significant ($p = 0.000$). Findings from this study affirm an earlier postulation that improvement in the breastfeeding knowledge of young adults influences a more positive breastfeeding intention thus increasing the likelihood of optimal breastfeeding among future parents (1).

CONCLUSION AND RECOMMENDATION(S):

From the findings, it is evident that leveraging on technology advancement through Instagram could be an alternative to delivering breastfeeding education to improve the breastfeeding knowledge and intention of young adults. Study of this nature should be scaled up to reach a wider population of young adults.

Table 1: Pre and Post Intervention Knowledge and Intention Distribution

Variables	Baseline		End line	
	Control n (%)	Intervention n (%)	Control n (%)	Intervention n (%)
Knowledge				
Inadequate	60 (75)	49 (70)	61 (76.3)	25 (35.7)
Adequate	20 (25)	21 (30)	19 (23.7)	45 (64.3)
Intention				
Poor	76.3	47 (67.1)	63 (78.7)	27 (38.6)
Good	23.7	23 (32.9)	17 (21.3)	43 (61.4)
Total	80 (100)	70 (100)	80 (100)	70 (100)

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The Knowledge, Attitude and Practice of Exclusive Breastfeeding among Students who are Nursing Mothers in Federal Cooperative College, Eleyele, Ibadan, Oyo State

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KEYWORDS: *knowledge, practice, nursing mothers, EBF.*

BACKGROUND:

Exclusive breastfeeding for the first six months of life has been accepted as the most vital intervention for adequate nutrition for optimal growth and development of infants; thus, reducing infant mortality and

under 5 mortality rates.

OBJECTIVE: The object of the study is to assess the knowledge, attitude and practice of exclusive breastfeeding (EBF) among students who are nursing mothers in Federal Cooperative College, Eleyele, Ibadan.

MATERIALS AND METHODS: Sixty student-mothers were recruited for the study, the inclusion criteria were the subjects that consented to be recruited to the study, while the exclusion criteria were those that objected to be recruited into the study. The respondents were interviewed about their knowledge, attitude, practice (KAP) of exclusive breastfeeding (EBF), using (KAP) questionnaire. The factors and relationship associated with motivations and constraints for exclusive breastfeeding were assessed, tabulated and analyzed using descriptive statistics and inferential statistics.

RESULTS AND DISCUSSION: Of the sixty respondents, 62% were single and 38% are married. 80% and 60% had good knowledge and attitude towards exclusive breastfeeding. The factors that really influenced their attitude and practice of exclusive breastfeeding were inability to breastfeed in public, age, single-motherhood, leaving babies in the care of parents or guardians whenever they are in school.

CONCLUSION AND RECOMMENDATION(S):

Majority of the respondents had good knowledge of importance of practicing exclusive breastfeeding but only few breastfed exclusively. Health care workers and tertiary institutions should actively work with families and female students to identify constraints and challenges; and sensitize and emphasize on the attitude, practice and compliance of exclusive breastfeeding in the first six months of life of infants. Awareness campaign should be organized for nursing mothers about the importance of exclusive breastfeeding (EBF) and how to overcome the barriers

Table 3: Attitudes of the respondents towards exclusive breastfeeding EBF

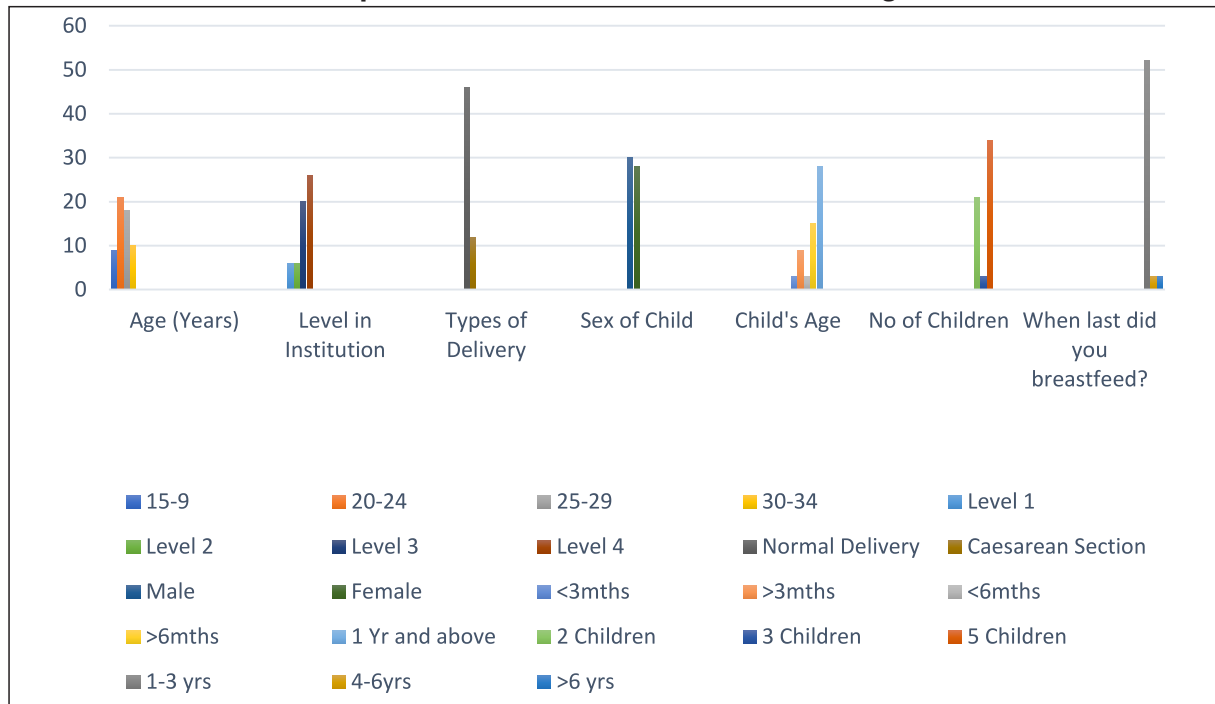


Figure 1: The Demographic Information of the Respondents

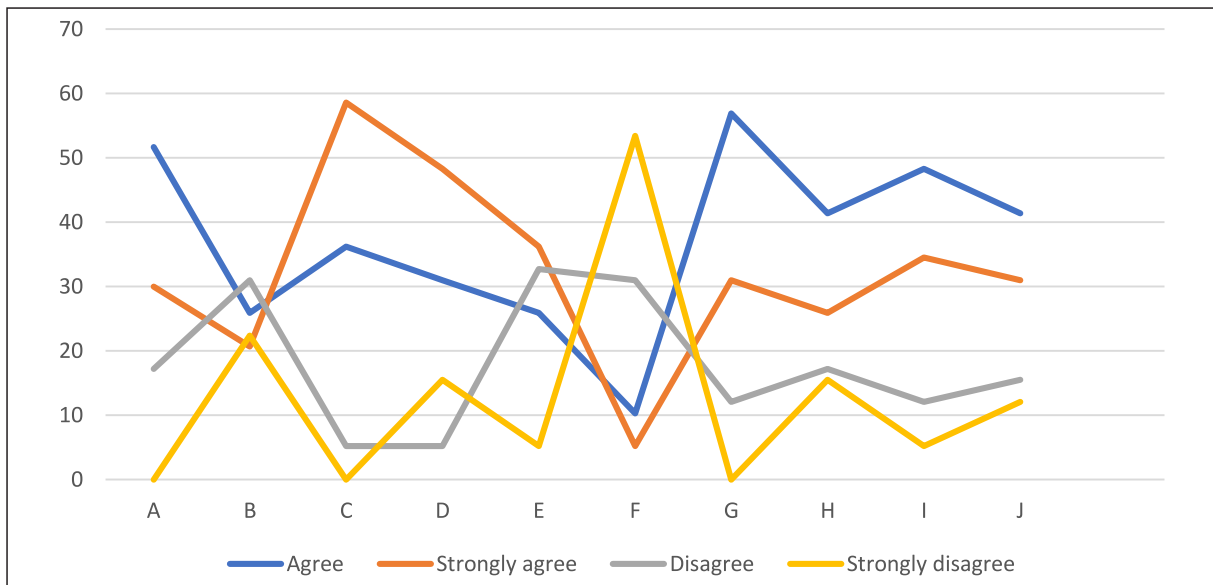


Figure 3: The Attitudinal Scores of the Respondents

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Nutritional Status Of School-Aged Children (6–12 Years) With And Without School Feeding Programme In Ife Central Local Government Area, Osun State, Nigeria

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KEYWORDS: School Feeding Programme (SFP), Nutritional Status, School-aged Children

BACKGROUND AND OBJECTIVE:

Over 200 million school-aged children worldwide are stunted and underweight (1). School feeding provides pupils with a free meal during the school day (2). The research objective is to compare the nutritional status of school-aged children in schools with and without feeding programme in Ife Central, Osun State.

MATERIALS AND METHOD: The cross-sectional descriptive study was carried out among school-aged children in selected primary schools within Ife Central. A multistage sampling method was used to select 268 pupils from six schools. Public schools in Ife Central participate in SFP, private schools do not. Two schools each (one public, one private) were selected from 3 areas of Ife Central. Socio-demography, dietary pattern, anthropometric information were collected with the aid of a structured interviewer-administered questionnaire. Data were analyzed with WHO Anthro Plus (version 1.0.4). Descriptive and inferential statistics at $\alpha_{0.05}$ were carried out using SPSS software version 20.

RESULTS AND DISCUSSION: A total of 134 non-SFP children (65 females, 69 males) with a mean age of 7.88 ± 1.32 years, and 134 SFP children (57 females, 77 males) with a mean age of 8.49 ± 1.89 years were studied. The mean anthropometric indices of the children can be seen in Table 1. The prevalence of underweight, stunting, thinness, overweight and obesity in the SFP (public) schools were 20.9%, 21.6%, 14.2%, 0%, 0%, respectively while in the non-SFP (private) schools the prevalence were 3.0%, 3.0%, 4.5%, 7.5%, and 2.2% respectively. There were significant statistical differences in the Mid Upper Arm Circumference (MUAC), Height-for-Age Z-score (HAZ), Weight-for-Age Z-score (WAZ) and BMI-for-Age Z-score (BAZ) between the SFP and the non-SFP schools; MUAC ($p=0.00$), HAZ ($p=0.00$), WAZ ($p=0.00$) and BAZ ($p=0.00$).

The nutritional status of the school-aged children reflected that the Private school children had better nutritional status than the Public school. This could be due to inadequate meal quality and could also be linked to possible differences in socio-demographic and economic characteristics of the private and public school parents.

CONCLUSION AND RECOMMENDATIONS

The prevalence of malnutrition was higher in the beneficiaries of SFP. It is therefore recommended that the

quality of the school meals be reviewed and more funds allocated for School Feeding Programme. Parents of children in the public schools should be well trained and empowered to provide adequate diets for their children.

Table 1: Anthropometric Indices of the Children

Variable	With School Feeding Programme		Without School Feeding Programme	
	Range	Mean (SD)	Range	Mean (SD)
Weight (kg)	13 – 39	22.40 ± 4.58	14 – 59	25.19 ± 5.14
Height (cm)	95 – 147.50	123.07 ± 10.07	106 – 161.50	126.47 ± 7.65
MUAC (cm)	14 – 23		10.80 – 26.20	
6 to 9 years		16.29 ± 1.45		17.69 ± 1.85
10 to 12 years		17.93 ± 1.55		18.81 ± 2.82
WAZ	-3.74 – 1.16	-	1.25 ± 1.08	-3.37 – 3.57
HAZ	-4.25 – 1.73	-	1.09 ± 1.19	-2.71 – 4.81
BAZ	-4.53 – 0.96	-	0.97 ± 0.99	-3.32 – 3.36

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Assessment of Knowledge and Practice of Preconception Folic Acid Supplementation among Pregnant Women (18-45 Years) in Enugu State University Teaching Hospital - Parklane

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KEYWORDS: Folic Acid, Supplementation, Antenatal care, Pregnant Women

BACKGROUND AND OBJECTIVE:

Folic Acid known as Vitamin B9 is one of the vital vitamins recommended for pregnant women especially during Antenatal Clinic in a hospital. Folic acid can be taken in form of folate (from natural sources such as green leafy vegetables, nuts, beans, avocado, kidney beans and peanuts) and as a supplement (synthetic source) [1]. A daily intake of 400mcg is recommended for pregnant women. Preconceptional folic acid supplementation is the provision of folate for women who have planned to be pregnant. Poor Antenatal Clinic attendance and poor knowledge of preconceptional folic acid supplementation have identified as the basic factors that influence adherence to intake of folate before and during pregnancy. Preconception care such as provision of essential nutrient, Nutrition Education which acts as an avenue to enlighten women on how to obtain folate in order to meet up to the Recommended Daily Intake (RDI), maintain good health, and Preconception Screening Tests are crucial as it helps to identify, prevent factors that could predispose the fetus to the risk of birth defects and reduce infant mortality rate [2]. The study aims to assess the knowledge and practice of preconception folic acid supplementation among pregnant women (18-45 years) in Enugu State University Teaching Hospital-Parklane.

MATERIALS AND METHOD: A cross-sectional study technique was employed in carrying out this study. The study population comprised of pregnant women within the age of 18-45 years attending Antenatal clinic in Enugu State University in Teaching Hospital- Parklane. Data was collected using a questionnaire which comprises of four sections; A, B, C, D of which section A are questions on the socio-demographic characteristics of pregnant women, B are questions on knowledge of folic acid, C are questions on source of information in folic acid and D are questions on folic acid intake. The questionnaire was distributed among 400 respondents.

RESULTS AND DISCUSSIONS: Results showed that pregnant women in Enugu State University Teaching Hospital have average knowledge of Preconception Folic Acid intake and 73.8% take folic acid when they are pregnant but not at preconception. The socio-demographic data of respondent from the study shows that majority of the respondents were between the age of 25– 31 years (44.5%) while respondents between the age of 39 -45years had the lowest percentage (7.3%) of the population.

The study shows that 85.8% of the women have heard of folic acid while 14.3% have not heard of folic acid. 90% of the women adhered to the recommended daily dose for folic acid for women of child-bearing age

while 44% of the women do not know the recommended daily dose. Also 27.2% accurately gave answers to the food sources of folic acid while 72.8% gave wrong answers. Out of 400 respondents, 46.2% are aware of the role of folic acid in the management of Neural Tube Defects(NTDs) where as 53.8% of the respondents are not aware.

Table 1: Knowledge of Folic Acid

Variables.	Frequency.	Percentage (%)
Have you heard of folic acid?		
Yes	343	85.8
No	57	14.3
What is the recommended daily dose for folic acid?		
200mcg	123	30.8
400mcg	90	22.0
5mg	4	1.0
5mg daily	2	0.5
800mcg	5	1.3
1 don't know	176	44.0
Total	400	100
Do you know the food sources of folic acid?		
Yes	109	27.2
No	291	72.8
Total	400	100
Do you know folic acid is used in management of NTD's?		
Yes	185	46.2
No	215	53.8
Total	400	100

CONCLUSION AND RECOMMENDATION: In conclusion, while the FDA goal of consuming at least 400 µg/d of Fatty Acid pre-conceptionally has been achieved by 22.6% of women of childbearing age, less than two percent (2%) of pregnant women consume daily doses that exceed the health experts. Therefore, all concerned health care professionals should put hands on deck through consistent counseling and follow-up to ensure that pregnant women in health institutions adhere to intake of folic acid. Moreover, the government should sponsor sensitization programmes which will act as a platform to enlightening the women race in the importance of not just knowing about folic acid intake but practicing folic acid intake at preconception.

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OA54

Breastfeeding Knowledge, Exclusive Breastfeeding Duration, And Perception Of Insufficient Breast Milk Supply Among Lactating Mothers In Ikwano Lga Of Abia State

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KEYWORDS: Exclusive breastfeeding, knowledge, duration, perception

BACKGROUND AND OBJECTIVE:

The rate of exclusive breastfeeding in Nigeria is still suboptimal [1]. Mothers' breastfeeding knowledge and perception of breast milk supply is integral to achieving optimum breastfeeding.

Objective: This study determined exclusive breastfeeding (EBF) knowledge, duration, and Perception of Insufficient Milk Supply (PIMS) among lactating mothers in Ikwano LGA.

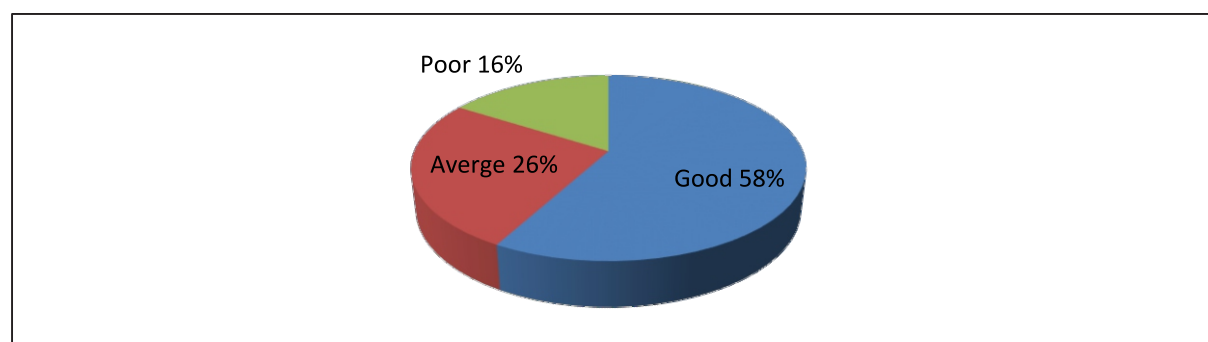
METHODS: Three hundred and fifty lactating mothers were randomly selected from five Primary Health Care centers in Ikwano LGA. A semi-structured questionnaire that comprised of socio-demographic characteristics, EBF knowledge and practice questions and Perceived Insufficient Milk Supply scale was used to elicit information from mother and infant (0-9 months) pairs. Data were analyzed using descriptive statistics.

RESULTS: Results revealed that 58% of mothers had a good EBF knowledge. The mean duration of exclusive breastfeeding was 3 months and only 24.1% practiced exclusive breastfeeding for 6 months. About 54% of the respondents perceived insufficient milk supply. Mothers used less sensitive indicators such as infant satiety cues and enough breast milk in the breast to identify PIMS, while sensitive indicators like weight gain and wet diapers were less reported. Inadequate food and drink intake was found to be responsible for most (65%) of mothers perceived reason for insufficient milk supply.

Table 1: Perception of insufficient milk supply questionnaire

1.	Breast milk can be insufficient for the baby	Yes No	75% 25%			
	Individual items			SA (%)	A (%)	D (%)
2	My breast milk is nutritious enough to nourish my baby			61.3	19.0	14.4
3	My baby appears satisfied after feeding			18.2	15.9	43.6
4	My breast milk contains all the nutrients my baby needs			20.5	30.1	29.1
5	My breasts seem to have enough milk			22.9	18.3	28.7
6	My baby is growing well because of breastfeeding			50.5	37.9	8.0
7	My baby has enough soiled napkins/diapers			53.0	24.8	14.3
8	Infant gained weight			46.0	47.5	4.9
	Total mean = 19.4 ± 5.1					

*Less sensitive indicator for breast milk insufficiency

**Figure 1. Mothers' Exclusive Breastfeeding Knowledge Level**

CONCLUSION: The duration of exclusive breastfeeding and exclusive breastfeeding rate was below the national target. Improving mothers' breastfeeding knowledge and educating them on the correct way of identifying insufficient milk supply are important determinants in achieving the six months EBF practices.

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Linear Growth and Blood Characteristics of Wistar Rats Fed Either Milk or Fish Based Complementary Foods.

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KEYWORDS: Complementary, milk, fish, growth.

BACKGROUND AND OBJECTIVE:

The prevalence of stunting among young children has been persistently higher than wasting and underweight for two decades. This has been linked to poor quality complementary food due to low animal source foods, high antinutrients, low dietary diversity among other factors [1]. Poor linear growth has more devastating effect and difficult to correct than low weight. Information on levels of potentiality of different protein sources from complementary foods on optimal growth is urgently needed to inform specific recommendations. Thus, this study aimed at comparing the effect of milk or fish based complementary food on linear growth and blood characteristics using animal model.

MATERIALS AND METHOD: The study adopted experimental research design involving formulation and feeding of two formulated complementary foods (COMPIF (fish based) and COMPIM (milk based)), as well as commercial complementary food (CCF) and protein-free diets to randomly distributed rats (8 per group) for 28 days. About 60-80 grams of diets and water (ad libitum) were offered to the rats daily. Length, weight and feed intake data were used to determine Feed conversion rates (FCR), feed efficiency rates (FER) and protein efficiency rates (PER1 and PER2) (2). Blood samples collected at 29th day were subjected to haematological and biochemical analysis. Data was analysed using ANOVA and Duncan Multiple Range Test.

RESULTS AND DISCUSSION: The results show that rats fed COMPIF gained significantly more weight than those fed COMPIM. Although, the COMPIF group had significantly more food (121.5g) than the COMPIM group (82.75g), no significant differences existed in the FCR, FER and PER1 of the diets. The greater weight gain among the rats fed COMPIF compared to other diets could be attributed to the larger feed intake because of the fish content. Greater weight gain among rats fed fish-based diets compared to other groups was also reported by [2] and [3]. In contrast, greater feed intake did not translate to greater length gain as rats fed milk based diet showed greater length gain, though not significant than those fed fish based and control diets. Except for white blood cells count, all measured haematological and biochemical parameters were similar for the formulated diets.

CONCLUSION AND RECOMMENDATION:

The fish based complementary food supported more weight gain than the milk-based diet but both had similar length gain effect. Milk based diet performed better in linear growth increment compared to the rats fed fish-based diet in terms of related protein intake. Both diets were similar in their effects on haematological and biochemical properties of the rats. Further study should be carried out for a longer period to ascertain the effect of complementary foods on linear and blood characteristics.

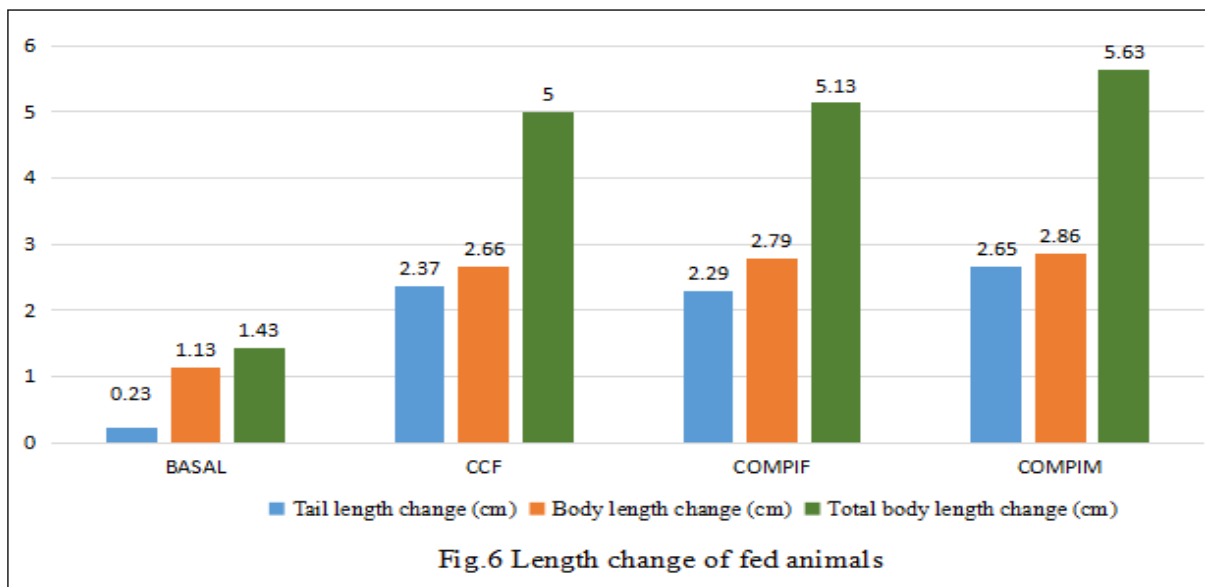


Table 1: Performance of rats fed with various diets

Parameters	BASAL	CCF	COMPIF	COMPIM
Weight gain/loss (g)	-8.29 ^c ± 2.28	51.88 ^{ab} ± 3.88	63.50 ^a ± 3.89	45.88 ^b ± 4.55
Food intake (g)	43.25 ^d ± 1.93	97.75 ^b ± 0.63	121.50 ^a ± 1.56	82.75 ^c ± 1.11
Protein intake (g)	2.60 ^c ± 0.31	15.15 ^b ± 0.88	20.66 ^a ± 1.10	13.24 ^b ± 0.50
FCR	-4.75 ^b ± 1.03	1.79 ^a ± 0.20	1.87 ^a ± 0.11	1.80 ^a ± 0.21
FER)	-0.25 ^b ± 0.61	0.56 ^a ± 0.08	0.52 ^a ± 0.03	0.56 ^a ± 0.07
PER1	-3.50 ^b ± 0.50	3.50 ^a ± 0.50	3.00 ^a ± 0.00	3.50 ^a ± 0.50
PER2	0.09 ^c ± 0.01	0.16 ^b ± 0.14	0.11 ^c ± 0.44	0.20 ^a ± 0.23
PCV (%)	28.00 ^b ± 1.08	38.50 ^a ± 1.85	39.25 ^a ± 1.49	41.33 ^a ± 2.19
Total protein (g/l)	72.65 ^a ± 3.67	64.33 ^{abc} ± 2.16	58.83 ^c ± 3.59	62.92 ^{bc} ± 2.59
Cholesterol (mmol/l)	1.98 ^b ± 0.88	2.38 ^{ab} ± 0.50	2.16 ^b ± 0.21	2.41 ^{ab} ± 0.19

Values indicates mean ± standard error (n=8). Means in the same row with different superscripts are significantly different (P < 0.05). Basal: Protein free diet, CCF: Commercial Complementary Food, COMPIF: Fish based diet, and COMPIM: Milk based diet.

CONCLUSION AND RECOMMENDATION:

The fish based complementary food supported more weight gain than the milk-based diet but both had similar length gain effect. Milk based diet performed better in linear growth increment compared to the rats fed fish-based diet in terms of related protein intake. Both diets were similar in their effects on haematological and biochemical properties of the rats. Further study should be carried out for a longer period to ascertain the effect of complementary foods on linear and blood characteristics.

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Effect of Peer Counseling by Mothers Support Groups on Infant and Young Child Feeding Practices in two Rural Communities in Ibadan, Oyo State, Nigeria.

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KEYWORDS: Infant and Young Child Feeding, Mothers support groups, Peer counseling

BACKGROUND AND OBJECTIVE:

Poor Infant and Young Child Feeding (IYCF) practices are sub-optimal and contribute to high burden of child malnutrition in Nigeria [1,2]. This is in spite of several IYCF interventions in Nigeria. Community-based support group interventions have the potential to reach and improve IYCF coverage among mothers [3] but their effects remain unexplored in Nigeria. This study was therefore conducted to determine the effects of peer-support group counseling on infant feeding practices of mothers in selected rural communities in Ibadan, Nigeria.

MATERIALS AND METHOD: A pretest-posttest quasi-experimental design involving systematic random sampling of 240 non-primigravid pregnant women from two rural communities with high incidence of severe acute malnutrition in Ibadan was used. A total of 120 respondents (pregnant women) with similar characteristics were each assigned into Experimental Group (EG) (Ido LGA) and Control Group (CG) (Oluyole LGA). A 15-month peer support community-based intervention involving training of mothers on IYCF practices and peer support coupled with a 12-months follow-up of the children via support groups at the community levels, was thereafter provided in the EG community. Baseline and Endline data were collected from both the experimental and control groups, using a semi-structured, interviewer-administered questionnaire comprising socio-demographic characteristics as well as a pretested and validated questionnaire comprising 36 questions on IYCF practices mostly requiring Yes/No responses. Respondents' responses were summed, scored and categorized as inadequate (0-17) and adequate (18-36). Data were analyzed using descriptive statistics with key IYCF practices summarized as frequencies, percentages, means and standard deviation. Pearson's Chi square and Student T-Test were used to test for associations and significant differences between the EG and CG at $p < 0.05$.

RESULTS AND DISCUSSION:

Age of Mothers was 28.7 ± 5.1 years, 98.8% were married, 97.1% were Yoruba and 60.8% had secondary education. Adequate IYCF practices among mothers improved from 19.8% at baseline to 41.7% at endline in EG while no improvement (33.0%; 25.8%) was observed among the control group. Community-based peer support counselling had a positive effect on the practice of the key IYCF indicators (Table 1). This finding is in line with the studies of Ara et al., and Kushawa et al., [4,5] which both demonstrated improvement in the practice of IYCF after exposure to similar intervention.

Table 1: Effect of peer support on the infant feeding practices of mothers

Effect of intervention on mothers' level of practice	Descriptive Statistics			Paired Differences				
	N	Mean	SD	95% CI				
				Mean±SD	Lower	Upper	t- value	P- value
Infant feeding practices Experimental (Endline) group	106	18.07	2.78	4.22±1.52	0.754	2.28	3.94	*0.000
Infant feeding practices (Baseline)	120	16.55	2.86					
Infant feeding practices Control group (Endline)	109	16.43	2.59	3.49±0.21	0.874	0.45	0.63	0.530
Infant feeding practices (Baseline)	120	16.64	3.17					

*Significant

Table 2: Selected IYCF Practices of Mothers at Baseline and Endline

IYCF Practices	Experimental			Control		
	Baseline (%)	Endline (%)	P value	Baseline (%)	Endline (%)	P-value
Child Ever Breastfed	93.3	100	0.019*	93.3	99.1	0.058
Early initiation of breastfeeding	38.3	57.5	0.051	50.8	43.1	0.026*
Fed Colostrum to index child	85.0	95.3	0.011*	82.5	93.6	0.011*
Practiced Pre-lacteal feeding	31.7	17.0	0.000*	25.8	42.2	0.009*
Practiced Exclusive Breastfeeding	40.0	61.3	0.028*	50.8	33.9	0.002*
Continued Breastfeeding at 1year	5.0	97.2	0.053	1.7	94.5	0.001*
Timely Introduction of solids, semi-solid or soft foods	42.5	62.3	0.000*	57.5	39.4	0.000*
Met Minimum Dietary Diversity	48.3	64.2	0.021*	36.0	30.6	0.389

*significant

CONCLUSION AND RECOMMENDATION(S):

Peer support group counseling improved infant feeding practices among women in rural areas of Ibadan. Efforts to promote appropriate infant feeding practices and reduce child malnutrition could therefore include the use of peer support groups.

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Socio Demographic Status And Perception Of Adolescents Mother On Breastfeeding Kodon Areas, Gombe Local Government, Gombe State: A Case Study

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KEYWORDS:

BACKGROUND AND OBJECTIVE:

The health and well-being of adolescent girls must be protected not only for themselves, but so they can become healthy mothers bearing healthy children. According to the World Health Organization as reported by Mohammadi *et al.* [1] very year approximately 16 million adolescent /teenage give birth worldwide posing a serious concern in many countries.

METHODOLOGY: A community based [with approval from the district head (Sarki)] cross sectional study was conducted on 200 adolescent mothers in Kwadom District of Yamaltu Deba Local Government Area of Gombe State. A systematic random sampling technique was used to collect the respondents' data. Verbal consent were sought and obtained from all participants. A pre-tested interviewer-administered structured questionnaire was used to collect the socio demography information, mothers' perception of breastfeeding, this was done by asking questions on their knowledge of breastfeeding, time of initiation of breastfeeding and some yes or no question etc., their responses were scored on the correctness and positivity of their answers. They scored as either low (<50) or high (>), and food frequency data of the respondents was also taken. Descriptive statistics were computed for different variables using Statistical Package for Social Sciences (SPSS version 21.0 software).

RESULT AND DISCUSSION: This study showed 90.5% of the respondents were married and were between the ages of 15 – 19 years and 42% had completed primary education. The findings agree with the findings of Rumi [2] that showed more of the adolescents' mothers completed primary education. However, 72% of our respondents were business women, this is contrary with the findings of Rumi [2] where majority of the respondents were housewives. The study also revealed that the perception of public breastfeeding among adolescent mother were low (30%) this might be as a result of shyness and embarrassment which Mossman [3] reported as factor that inhibits breastfeeding among adolescent mothers. And this might lead to replacement of breast milk with formula and other complementary feed by adolescent mothers, findings of Scott *et al.* [4].

CONCLUSION: Public breastfeeding among adolescent mothers were low this could reduce the numbers of mothers who might want to exclusively breastfeed their children. Adolescent mothers face numerous challenges that put demand not only on the young mother stage of adolescent development but also on their ability to adapt to the obligation of parenthood.

RECOMMENDATION:

Government should build an easy accessible mini post for breastfeeding mother to breast feed their infants, this will encourage those who wants to exclusively breast feed their children for the duration of the six months.

RESULTS**Table 1: Socio Demographic characteristics of the respondents**

Variables	Frequency (N)	Percentage (%)
Age in years		
10 – 14	0	0
15 – 19	200	100.0
Total	200	100%
Educational level		
Primary	85	42.5%
Secondary	76	38.5%
Tertiary	0	0%
None	38	19%
Total	200	100%
Marital status		
Single	2	1.0
Married	181	90.5
Divorced	2	1.0
Widow	15	7.5
Total	200	100%
Occupation		
Student	0	0
Business	147	72.5
Housewife	45	22.5
Civil servant	8	4.0
Others	2	1
Total	200	100%
Monthly income		
Below 5000	130	65.0
5000 – 10, 000	7	3.5
11,000 – 20, 000	63	31.5
21,000 – 30,000	0	0
Above 30,000	0	0
Total	200	100%

Table 2: Mothers' Perception of Breastfeeding

Variable	Frequency(n)	Percentage (%)
Breastfeed in public		
Yes	70	30
No	140	70
Total	200	100
Time of initiation of breastfeeding		
1-3 hours after birth	140	70
1-3 days after birth	53	26.5
Others specify	7	3.5
Total	200	100
Numbers of times you breastfeed your child		
Whenever the baby cries	114	57
5 – 8 times	65	32.5
Based on child's demand	21	10.5
Total	200	100
Engagement of exclusive breastfeeding		
Yes	130	65
No	70	35
Total	200	100
Understanding of exclusive breastfeeding		
Giving breast milk and water	50	25
Giving breast milk alone	150	75
Giving breast milk with cow milk	0	0
Total	200	100
Intended duration of breastfeeding		
0 – 8 months	20	10
9 – 16 months	57	28.5
17 – 24 months	123	61.5
Total	200	100

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Knowledge And Attitude Towards Exclusive Breast feeding Among Unmarried Young Women In Ondo And Osun States, Nigeria

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KEYWORDS: Exclusive breastfeeding, Breast milk, young women

BACKGROUND AND OBJECTIVE:

The global nutrition target on infants is to increase the rate of exclusive breastfeeding in the first 6 months up to at least 50% by 2025. Only 29% of children under age 6 months are exclusively breastfed in Nigeria [1]. Lots of researches have focused on breastfeeding knowledge and practice among pregnant women and mothers but this has been sparsely assessed among young unmarried women. This study was therefore designed to assess the knowledge and attitude of young women towards exclusive breastfeeding within Odigbo Local Government Area (LGA) in Ondo state and Iwo LGA, Osun state.

MATERIALS AND METHOD: This descriptive cross-sectional study was carried out among young unmarried women within the ages 18-35years in Ore, Odigbo LGA, Ondo State and Iwo in Iwo LGA of Osun State. A multistage sampling method was used to randomly select 390 respondents from Ore and Iwo. Self-administered questionnaire was administered to collect information on socio-demographic characteristics, knowledge and attitude of the young women towards exclusive breastfeeding. A 20-item questionnaire with 1-point assigned to every correct response, and 0-point to incorrect responses was used. Respondents' total knowledge was scored and grouped as "good" (70th percentile), "fair" (40th–70th percentile), and "poor" (<40th percentile) according to Romanos-Nanclares et al., [2]. A 10-item questionnaire comprising of 5 points- Likert scale was used to score the attitude of the respondents which was further grouped as either positive or negative attitude as described by Ogunba and Agwo [3]. Descriptive statistics at $\alpha_{0.05}$ were carried out using SPSS software version 20.

RESULTS AND DISCUSSION:

The mean age of respondents was 22.60 ± 3.70 . Majority (86.9%) had heard about exclusive breastfeeding and its importance, most of the respondents sourced information from school (33.3%) and family (33.1%). For the knowledge score, 37.7%, 33.1% and 29.2% of the respondents had poor, fair and good knowledge respectively. A little above half of the respondents (55.1%) had negative attitudes, while 44.9% of respondents had positive attitudes towards breast feeding. The perceived barriers to exclusive breastfeeding are shown in Table 1.

CONCLUSION AND RECOMMENDATION:

The young women assessed had an average knowledge on exclusive breastfeeding and an averagely positive attitude towards exclusive breastfeeding. However there may be a need to strengthen their self-efficacy so that they can overcome their perceived barriers and their knowledge may result in action at the appropriate time.

Table 1: Perceived barrier to Exclusive Breastfeeding

Perceived barrier	Frequency	Percentage
Time	19	4.9
Tiredness	47	12.1
Work	137	35.1
None	100	25.6
Health issues	87	22.3
Total	390	100

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SUB-THEME B: PLANNING, POLICY, ADVOCACY AND ACCOUNTABILITY

PB1

Sources of Nutritional Information for Management of Chronic Renal Failure By Dietitians in Ogun State

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KEYWORDS: Renal diseases. Internship, Training, Internet.

BACKGROUND AND OBJECTIVE:

Renal disease is an important component of chronic non-communicable diseases that are now of pandemic proportions and a major cause of morbidity and mortality worldwide.

Renal disease is a permanent and progressive loss of kidney function, which can depreciate and deteriorate to renal function or end-stage renal disease. The incidence and prevalence of renal disease has increased in recent years in both developed and developing countries including Nigeria (1). Internship students who are being trained to have direct, constant and consistent interactions with patients during hospitalization are in a good position to acquire germane knowledge that will help to counsel and guide on scientific and practical dietary therapies. However, ability of healthcare practitioners to provide quality, accurate, practical and consistent dietary advice appropriate to the needs of patients is limited (2). There is limited information on the sources of nutrition knowledge for healthcare practitioners in the management of renal disease in Nigeria. Therefore, the thrust of this study is to evaluate nutritional management of chronic renal failure.

METHODS: A pretested structured Questionnaires were used to obtain information from randomly selected five hundred internship students in Ogun State. Data were presented using frequency counts, percentages, tables and Correlation

RESULTS: Table 1 below shows the responses of respondents' nutritional management by the interns. Eighty five percent (85%) received nutritional management training in the institution out of which thirty percent had clinical nutrition, thirty eight percent had community nutrition, and thirty percent had basic training. Sources of information from Medical nutrition Therapy indicated that the majority, seventy four percent (74) access information from Medical Therapy sources. More than half (94%) obtained information from the Nutritional Text Guide. Higher percentage Eighty seven (87%) received information from internet

Table 1: Sources of knowledge in nutritional management of chronic renal failure

Parameter	Frequency	Percentages	Dietitian Management
Nutritional Management Training			
Yes	423	85	
No	77	15	
Pearson correlation			000
Specification			
Clinical nutrition	161	32	
Community nutrition	188	38	
Medical Nutrition Therapy			
Yes	131	74	
No	129	26	
Nutritional Text Guide			
Yes	468	94	
No	32	6	
Internet			
Yes	436	87	
NO	64	13	

CONCLUSION AND RECOMMENDATION

The study showed that most information harnessed by the internship students on renal diseases are from the internet. There is a significant relationship between information and knowledge of nutritional management on chronic renal failure by dietitians. Interns should be encouraged to diversify their sources of knowledge

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Assessment of alcohol consumption pattern Among civil servants in Abeokuta, Ogun State

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KEYWORDS: Alcohol, Civil servants, consumption

BACKGROUND AND OBJECTIVE:

Alcohol consumption is a serious public health challenge worldwide, including Nigeria. Although the level of alcohol consumption differs widely around the world, the burden of disease and death remains significant in most regions of the world. Recent evidence also indicates that alcohol consumption is now the world's third largest risk factor for disease and disability. Almost 4% of all deaths globally are attributed to alcohol consumption. However, alcohol is the most commonly used psychoactive drug in both young people and adults in Nigeria. Some of the factors contributing to alcohol consumption among Nigerians include the absence of alcohol policies, easy access to alcoholic drinks, and lack of implementation of a minimum drinking age by both the government and the brewers(1)

METHOD:

A multi stage sampling procedure was used. In the first stage, lower cadre of civil servants) out of the ministries in the state was purposively selected. Beverage Survey questionnaires were used to obtain information from five hundred selected civil servants in Abeokuta Ogun State. Data were presented using frequency counts, percentages, tables and Correlation

RESULTS

ALCOHOL INTAKE OF THE RESPONDENTS

Table 1 showed that 80.7% of the respondents took alcoholic drinks while 11.9% did not take alcoholic drinks. Also, 52.6% started drinking alcohol at the age range of 12-26 and 11.1% started drinking alcohol at age 26-35. Furthermore, 68.9% had consumed alcohol within the past 30 days and, 23.5% did not consume alcohol within that period. Precisely, 12.2% took alcohol less than once a week, 57.8% took alcohol 1-2 times a week and, 4.3% took alcohol 3-6 times a week. Also, 8.1% took alcohol every day. The results further showed that 72.6% took 1-2 bottles of alcohol in a drinking occasion, 17.2% took 3-4 drinks in a drinking occasion and, 2.4% took 5-6 drinks in a drinking occasion. In the results, it was shown that 20.7% consumed more than 5 bottles of alcohol in a single sitting, 71.5% did not consume more than 5 bottles of alcohol in a single sitting. It was also revealed that, 1.0% stopped drinking at age 38-46, 9.6% stopped drinking as a result of stress management/ counselling sessions they were put through., However, 19.4% did not stop due to the stress management/ counselling session. Also,, 10.0% stopped drinking on work free days/ sick leave but 19.1% still drank on work free days/ sick leave respectively

TABLE 1: Alcohol Intake Among Respondents

ALCOHOL INTAKE	FREQUENCY	PERCENTAGE %
Yes	436	80.7
No	64	11.9
AGE STARTED		
12-26	284	52.6
26- 36	60	11.1
PAST 30 DAYS CONSUMPTION		
Yes	372	68.9
No	127	23.5
FREQUENCY PAST 30 DAYS		
Less than once a week	66	12.2
1-2 times/week	312	57.8
3-6 times/week	77	14.3
Everyday	44	8.1
NUMBER OF BOTTLES TAKEN		
1-2 drinks	392	72.6
3-4 drinks	93	17.2
5-6 drinks	13	2.4
5 ALCOHOL CONSUMPTION PAST 30 DAYS		
Yes	112	20.7
No	386	71.5

CONCLUSION AND RECOMMENDATION

The study showed that most civil servants consumed alcoholic drinks and this began at tender age. There is a need for nutrition education and awareness for the civil servants on the impact of alcohol on human health.

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Strengthening the nutrition data for accountability in Rivers State, Nigeria: Emerging issues and action.

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KEYWORDS: Strengthening; Nutrition Data; DHIS2; Accountability; Revolution agenda.

BACKGROUND:

Supporting components of Health Management Information System are areas of focus in Primary Health Care approach to health system strengthening to closing the equity gaps in maternal newborn and child nutrition towards Universal Health Coverage. Optimizing DHIS provides the necessary information for evidence-based prioritization, improvements to interventions, resource allocation and monitoring and evaluation.

OBJECTIVE: The paper aimed to explore the DHIS 2 platform to establish existence of gaps or not in nutrition indicators' elements that would direct effective and functional surveillance in advancing the nutrition data revolution agenda.

METHODOLOGY: The method used was a retrospective review of data on nutrition indicators from 2017-2021 on the DHIS2 platform to establish extent of relevant gaps to direct policy and accountability towards nutrition data revolution agenda.

FINDINGS: The results of data in the period under review indicated gaps in coverage of nutrition indicators in areas of; exclusive breastfeeding coverage which declined from, 187% to 134% between 2017 and 2021. Percentage of under 5 years children weighed were 57%, 79%, 57%, in 2017, 2018, 2019 and 44% in both 2020 and 2021 respectively. Vitamin A supplementation progressively declined also from 119% in 2019, 106% in 2018 71% in 2017, 64% and 19% in 2021 and 2020 respectively. The state achieved highest deworming rate in 2019 (72%) within the 5 years review. Children identified on Severe Acute malnutrition were 0.3% in 2018 and 0.03% in 2021, out of these only 0.1% and 0.01% respectively were managed at the facilities. These findings as nutrition indicator gaps may be associated with poor capacity and knowledge in nutrition data elements as well as poor staffing and issues of remuneration as demotivators in performance for improved results.

CONCLUSION/RECOMMENDATIONS:

The DHIS 2 platform as a data management tool as applicable in Nigeria, may not fast track the achievement of the much-needed nutrition data revolution agenda due to poor human capacity and knowledge in nutrition data elements, data harmonization mechanisms and associated demotivation

factors. Therefore, the recommendations as provided in this paper should be given adequate attention.

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SUB-THEME C: AGRICULTURE, NUTRITION, FOOD SYSTEMS, ENVIRONMENT AND HEALTH

OC1

Association Between Socio-demographic and Economic Characteristics, and Quality of Life of Elderly's in Oyo State, South West, Nigeria.

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KEYWORDS: Quality of Life, Socioeconomic and demographic Characteristics.

BACKGROUND AND OBJECTIVE:

Quality of life among elderly is an important area of concern that reflects the health status of this vulnerable population, as it might be influenced by socio-demographic and economic, physical, psychological, social and environmental changes that occur with aging. Thus, this study aimed to assess the association between socio-demographics and economic characteristics, and quality of life of elderly's in Oyo State, Nigeria.

MATERIALS AND METHOD: Multistage sampling technique was employed to select 1000 elderly's. Data on socio-economic and demographic, and quality of life were obtained using a semi-structured questionnaire, World Health Organization Quality of Life Bref (WHO QOL – BREF) respectively. Data were coded and analyzed using Microsoft Excel 2019 and SPSS version 23. The results were presented using frequency count, percentages, means, standard deviation and Chi-Square Test.

RESULTS AND DISCUSSION: Results presented in Table 1 revealed that factors such as education, occupation and marital status were found to be statistically significant ($p < 0.05$) with all the four domains of quality of life. This observed association between physical health, psychological, social relationships, environmental and marital status supported (1) and (2) findings who reported that quality of life was significantly affected in those who were not living with spouse.

CONCLUSION:

This study concluded that quality of life is a comprehensive concept that not only emphasizes on the four domains but also connected with socioeconomic and demographic factors.

Table 1: Association between the WHO QOL – BREF Domain Score with Socio-Demographic and Economic Factors of the Elderly's

Variables		QOL Domain Mean Score			
		Physical Health	Psychological	Social Relationships	Environment
Gender	Male	44.83	47.99	48.84	44.66
	Female	44.63	48.01	48.45	44.90
	P-value	0.729	0.964	0.531	0.766
Age group	65 –74 years	45.46	48.37	48.84	44.86
	75 –84 years	41.44	46.46	47.74	44.72
	≥85 years	40.70	45.38	47.29	42.78
	P-value	0.00*	0.004*	0.364	0.725
Location	Rural	43.53	48.08	47.64	43.41
	Urban	45.26	47.97	49.09	45.41
	P-value	0.04*	0.834	0.034*	0.016*
Education	None	43.37	48.86	46.58	46.44
	Primary	45.49	48.37	49.81	46.04
	Secondary	48.67	50.88	52.22	50.61
	Tertiary	48.13	49.58	53.60	51.38
	Others	44.00	46.75	46.36	47.75
	P-value	0.00*	0.00*	0.00*	0.00*
Occupation	Employed	40.39	46.46	44.20	39.12
	Retired	40.23	44.77	43.61	39.95
	Others	45.60	48.35	48.85	45.38
	P-value	0.00*	0.00*	0.00*	0.00*
Income	< ₦20,000	44.69	47.91	47.85	44.79
	₦20,000 – ₦49,999	43.43	47.52	49.55	44.30
	≥₦50,000	50.60	55.20	53.33	51.00
	P-value	0.003*	0.016*	0.001*	0.353
Marital Status	Single	48.40	48.40	48.33	44.00
	Married	46.12	48.93	50.51	46.26
	Separated	40.59	45.30	43.21	40.64
	P-value	0.00**	0.00**	0.00**	0.00**

* P-value significant at $p \leq 0.05$

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PC3

Nutrient Adequacy, Anthropometric Indices, and Prevalence of Hypertension among Civil Servants in Abeokuta, Ogun State

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KEYWORDS: Diet Quality, Hypertension, Body Mass Index

BACKGROUND:

Nutrition transition and a global shift in food consumption pattern, has greatly influenced dietary habit and nutrient adequacy [1] which in turn has increased the prevalence of overweight, obesity, and hypertension. This study aims to assess nutrient adequacy, anthropometric indices, and blood pressure of civil servants in Abeokuta

MATERIALS AND METHOD: A descriptive cross-sectional design was used. A total number of 232 civil servants within the age range of 20-59 years were randomly selected. A semi-structured questionnaire was used to collect information on the bio-data and socio-economic characteristics of respondents. Nutrient intake, dietary habit, and dietary diversity of the respondents using a 24-hour dietary recall, dietary habit, and dietary diversity score questionnaires. Nutrient intake was compared with Recommended Dietary Allowance and classified as inadequate (<60%), adequate (60-80%), and excess intake (>80%) to assess nutrient adequacy ratio. Anthropometric measurements were carried out using standard procedures. Data were analyzed using frequencies and percentages. Chi-square and correlation analysis were used to determine the association and relationship between variables.

RESULTS AND DISCUSSION: The result shows that 57.3% of the respondents were male, and 42.7% were female. The mean age of respondents was 40 years. Few (male=36.4% and female=38.3%) respondents had elevated blood pressure and there was a relationship between age and blood pressure

which implies that the older we get, the greater the risk of having high blood pressure [2]. Reports from other studies showed that hypertension decreases with an increase in the educational level [2], such observation was not noted in this study even though most civil servants had tertiary education. Prevalence of overweight and obesity was noticed among female respondents from age 41-60 years, the same was recorded by Oladimeji [3], this might be explained by the sedentary lifestyle associated with this group of the population.

Table 1: Nutrient intake and Nutrient Adequacy of Male Respondents

Variable(male)	Median \pm S.E	RDA	NAR	Inadequate intake (<60%)	Adequate intake (60-80%)	Excess intake (80_100%)
Calorie(kcal)	1618.46 \pm 201.85	2900	55.81	74(55.6%)	36(27.1%)	23(17.3%)
Protein(g)	55.94 \pm 57.78	56	99.89	27(20.3%)	16(12%)	90(67.7%)
Carbohydrate(g)	271.42 \pm 15.71	130	208.78	17(12.8%)	2(1.5%)	114(85%)
Fiber(g)	27.54 \pm 2.16	38	34.43	67(50.4%)	19(14.3%)	47(35.3%)
Fat(g)	21.54 \pm 2.15	80	26.93	117(88%)	2(1.5%)	14(10.5%)
Cholesterol(mg)	47.26 \pm 15.91	300	15.75	110(82%)	5(3.8%)	18(13.5%)
Vitamin A(μ g)	529.22 \pm 80.16	700	75.60	51(38.3%)	21(15.8%)	61(45.9%)
Vitamin C(mg)	25.30 \pm 12.42	90	28.11	85(63.9%)	7(5.3%)	41(30.8%)
Vitamin B1(mg)	1.60 \pm 2.09	1.2	133.3	49(36.8%)	21(15.8%)	61(45.9%)
Vitamin B2(mg)	1.23 \pm 0.67	1.3	94.61	44(33.1%)	16(12%)	73(54.9%)
Vitamin B3(mg)	10.66 \pm 0.09	16	66.63	2(1.5%)	27(20.3%)	104(78%)
Vitamin B6(mg)	0.86 \pm 3.23	1.3	66.15	58(43.6%)	28(21.1%)	47(35.3%)
Folate(μ g)	144.84 \pm 27.86	400	36.21	78(58.6%)	12(9%)	43(32.3%)
Vitamin B12(μ g)	2.60 \pm 5.51	2.4	108.33	42(31.6%)	19(14.3%)	72(54.1%)
Calcium(mg)	523.74 \pm 35.52	1000	52.37	77(57.9%)	22(16.5%)	34(25.6%)
Phosphorus(mg)	754.89 \pm 46.64	700	107.84	27(20.3%)	5(11.3%)	91(68.4%)
Sodium(mg)	1030.89 \pm 121.98	1500	68.73	58(43.6%)	16(12%)	59(44.4%)
Potassium(mg)	1520.69 \pm 105.61	4700	32.35	10(83.5%)	14(10.5%)	8(6%)
Iron(mg)	16.73 \pm 2.76	8	209.13	8(6%)	15(11.3%)	110(82%)
Magnesium(mg)	227.22 \pm 13.09	420	54.10	76(57.1%)	33(24.8%)	24(18%)

CONCLUSION AND RECOMMENDATION(S):

This study shows that overweight and central obesity was prevalent among female civil servants. The prevalence of elevated blood pressure increases with age. There was an association between socio-economics, body mass index, blood pressure, and waist-hip and no association between nutritional knowledge and dietary habits. Population interventions are needed to promote nutritious food selection and a healthy lifestyle. This study recommends that the respondents should consume an adequate diet and lower the intake of fatty foods.

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PC4

Effect of Covid 19 Pandemic on the Food Security among Urban Households in Oshodi Isolo LGA, Lagos State, Nigeria.

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KEYWORDS: Food Security, Covid 19 Pademic, Household, Food Supply.

BACKGROUND:

Covid-19 is more than a health crisis; it is also a social, economic, and developmental issue affecting agriculture, food, and nutrition security, necessitating immediate and sustained action [1]. One of the most challenging issues in the world today is how to provide sufficient food to more than seven billion people around the globe. It is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious foods that meets their dietary needs and food preferences for a healthy life [2]. The study aimed is to assess the effect of covid-19 pandemic on food security.

MATERIALS AND METHODS: A cross sectional study was conducted among households in Oshodi Isolo L.G.A of Lagos State using multi-stage random sampling method. Data were analyzed using statistical package for social sciences (SPSS) software program, version 20.0 Descriptive statistics such as frequency, mean, standard deviation and regression were carried out at 5% significance.

RESULTS AND DISCUSSION: Result from the study shows that majority (77.4%) of the respondents were female, 62.0% were between ages 20-34, majority (73.4%) were Igbo's while 10.6% Yoruba. More than average (64.6%) of the respondents was food secure while 35.4% were food insecure which is in agreement with the finings of Imhoff and Lamberty [3] and contrast with the report of Syafiq *et al* [4]. Covid-19 has a significant effect on food security, prices of food items, livelihood, nutrition services and food supply which agrees with the finidngs of Espitia *et al* [5].

Table 1: Socio-demographic and Socio-economic characteristics of the respondents.

Variables	Frequency(N=274)	Percentage(%)
Gender		
Male	62	22.6
Female	212	77.4
Age (years)		
20-34	170	62.0
35-49	73	26.6
50-64	31	11.3
Religion		
Christianity	264	96.4
Islam	10	3.6
Ethnicity		
Hausa	21	7.7
Igbo	201	73.4
Yoruba	29	10.6
Others	23	8.4

Table 2: Household Food Insecurity Score of the Respondents

Variables	Frequency(N=274)	Percentage(%)
Food secure	177	64.6
Food insecure	97	35.4
Total	274	100.0

CONCLUSION AND RECOMMENDATION:

Findings from the study shows that the covid-19 pandemic had an effect on food security which led to 35.4% of the respondents being food insecure. And households should have home garden to have food available and accessible to them.

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PC5

Assessment of the Dietary Intake and Anthropometric Characteristics of HIV positives Attending the University of Medical Science Teaching Hospital, Akure, Ondo State.

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KEYWORDS: Dietary intake, Anthropometric characteristics, HIV, HIV positive

BACKGROUND:

The importance of nutrition in human immunodeficiency virus (HIV) is well established[1]. However, many HIV positives are unaware of the debilitating effect of consuming above or below the adequate diet on their health status[2]. The objective of this study is to assess the dietary intake and anthropometric characteristics of HIV positives attending the University of Medical Science Teaching Hospital, Akure, Ondo State, Nigeria.

MATERIALS AND METHOD: The study was performed on 100 HIV positives between the ages of 20-64 registered at the Anti retroviral center (ART) section of the Hospital which were selected using systematic random sampling. Socio-economic characteristics of respondents were collected using questionnaires. Anthropometric data including height, weight, waist and hip circumferences were collected; 24-hour dietary recall questionnaire was administered to gather information on nutrient intake from which nutrient ratios were computed using the Total Diet Assessment (TDA) software. The respondents' dietary patterns were assessed using a food frequency questionnaire while the hospital's record was checked for biomarkers of HIV (viral load) in respondents. The data were processed using Statistical product and Service Solution (SPSS) version 20. Categorical data were summarized into frequencies and proportions while continuous

data were expressed as means and standard deviations. Nutritional status, socio-economic and demographic characteristics of the respondents was compared with the viral load of the respondents using the chi square and bivariate correlation.

RESULTS AND DISCUSSION: The mean BMI of the respondents was 19.73kg/m², the median viral load was 30copies/ml. The BMI, total protein and calorie were found to correlate negatively with the respondent's viral load and the income correlated positively with viral load significantly (P<0.05). Most of the respondents consumed in excess of their requirements for energy, protein, fat, calcium, potassium, vitamin A and zinc. The result of the study shows that 54.7% of the respondents had BMI above normal range. There was inverse relationship between viral load and calorie, protein, BMI and a direct correlation with income all with statistical significance. The prevalence of overweight and obesity in this study was higher due to the fact that all respondents were using antiretroviral drugs (ARVs) and most were consuming above the normal RDA for their respective ages.

CONCLUSION AND RECOMMENDATION(S): The findings of this work negates the popular belief that HIV positives are usually undernourished. Therefore for patients adhering strictly to Anti-retroviral regimen, the rhetoric have changed for the fight against opportunistic infections or fight against malnutrition but towards effective nutrition counseling, consumption of adequate diet so as to avoid obesity and Non-communicable diseases (NCDs).

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Metabolic Syndrome among people living with HIV/AIDS – A case control Study

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KEYWORDS: Metabolic, Syndrome, Antiretroviral, Therapy

BACKGROUND:

Metabolic syndrome (MetS) is a cluster of biochemical and anthropometric abnormality that has high predictive ability for the development of atherosclerotic cardiovascular diseases [1]. A great number of people living with HIV are showing evidence of MetS. This study therefore explores the prevalence of MetS among PLWHIV attending Federal Medical Center Abeokuta.

MATERIALS AND METHOD:

The study was case-control and descriptive in design. A total of 250 respondents were randomly selected (125 PLWHIV and 125 healthy individual). A structured questionnaire was used to collect their socio-demographic information. Anthropometric data and blood pressure measurements were collected using appropriate tools. Blood samples collected were separated to obtain serum for lipid profile and plasma for Fasting Plasma Glucose (FBG). Metabolic syndrome was defined using International Diabetes Federation (IDF) criteria [2]. Data obtained were summarized using descriptive statistics while Chi-square was used to test for the relationships and level of significance set at 5%. All analyses were carried out using the IBM SPSS version 25. Ethical approval and written informed consent was obtained from the participants.

RESULTS AND DISCUSSION:

The BMI of the respondents as well as the component and prevalence of MetS are presented in Table 1. The prevalence of MetS among PLWHIV is 19.5%. Other studies have reported prevalence of 17.2%, 20.5%, 43.4%, and 24.3% [3]. Meanwhile, the prevalence of MetS among the apparently healthy individual in this study was 6.5%.

CONCLUSION AND RECOMMENDATION:

There is high prevalence of MetS among PLWHIV compare to the controls in this study. Central obesity is the most prevalent determinants of MetS among the two population and this connotes that irrespective of HIV status, central obesity is a risk factor for MetS. Therefore, it is pertinent that screening for MetS should be integrated to routine care service at various ART clinics to reduce co-morbidities.

Table 1: BMI, waist circumference, component and prevalence of MetS of respondents

Characteristics	Case (n=123) n (%)	Control (n=124) n (%)	Both (n=247) n (%)	p- value	Component	Case n (%)	Control n (%)	Combined n (%)	p- value
					Central Obesity				
Underweight	6 (4.9)	4 (3.2)	10 (4.0)		Yes	88 (71.5)	81 (65.3)	169 (68.4)	.180
Normal	57 (46.3)	44 (35.5)	101 (40.9)		No	35 (28.5)	43 (34.7)	78 (31.6)	
Overweight	32 (26.0)	41 (33.1)	73 (29.6)	.421	Raised Triglycerides				
Obese I	20 (16.3)	26 (21.0)	46 (18.6)		Yes	12(9.8)	6(4.8)	18(7.3)	.107
Obese II	8 (6.5)	8 (6.5)	16 (6.5)		No	111(90.2)	118(95.2)	229(92.7)	
Morbidly Obese	0 (0.0)	1 (0.8)	1 (0.4)		Reduced HDL Cholesterol				
					Yes	49(39.8)	28(22.6)	77(31.2)	.003*
WC (female)					No	74(60.2)	96(77.4)	170(68.8)	
Normal(<80cm)	18(17.8)	22(23.4)	40(20.5)		Raised Blood Pressure				
High(≥80cm)	24(23.8)	20(21.3)	44(22.6)	.637	Yes	33(26.8)	10(8.10)	43(17.4)	.000*
Very high(≥88cm)	59(53.2)	53(55.8)	112(57.1)		No	90(73.2)	114(91.9)	204(82.6)	
WC (male)					Raised Fasting Plasma Glucose				
Normal(<94cm)	17(77.3)	21(72.4)	38(74.5)		Yes	30(24.4)	22(17.7)	52(21.1)	.130
High(≥94cm)	3(13.6)	5(17.2)	8(15.7)		No	93(75.6)	102(82.3)	195(78.9)	
Very high(≥102cm)	2(9.1)	3(10.3)	5(9.8)		Prevalence of MetS				
					Yes	24(19.5)	8(6.5)	32(13.0)	.002*
					No	99(80.5)	116(93.5)	215(87.0)	

CONCLUSION AND RECOMMENDATION:

There is high prevalence of MetS among PLWHIV compare to the controls in this study. Central obesity is the most prevalent determinants of MetS among the two population and this connotes that irrespective of HIV status, central obesity is a risk factor for MetS. Therefore, it is pertinent that screening for MetS should be integrated to routine care service at various ART clinics to reduce co-morbidities.

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OC7

Hypertension and Associated Risk Factors among Civil Servants in Abeokuta South Local Government Area, Ogun State

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KEYWORDS: Hypertension, diabetes mellitus; obesity

BACKGROUND AND OBJECTIVES: Hypertension constitutes a serious medical condition that disproportionately predispose more individuals in the low and middle income countries (LMICs) to non-communicable diseases (NCDs) due to increases in its risk factors in these settings (1). The role of workplace in individuals' health behaviours and outcomes has been acknowledged, yet most LMICs fail to consider workplace as a potential platform to tackle NCDs in national health promotion policies and programmes (2). Describing the risk factors of NCDs in different workplaces will reinforce the need for appropriate policies and actions for disease prevention within each setting. Information on hypertension and its risk factors among civil servants in Southwest Nigeria is limited. Hence, this study assessed hypertension and associated risk factors among civil servants in Abeokuta South Local Government Area (LGA), Ogun State, Nigeria.

MATERIALS AND METHODS: The cross sectional and descriptive study adopted a multistage sampling technique to select 350 civil servants from three strata within five wards selected within the LGA. Hypertension were defined as Systolic BP (SBP) ≥ 140 mmHg and or Diastolic BP (DBP) ≥ 90 mmHg. Overweight and obesity were defined as body mass index (BMI) values - 25-29.9 kg/m² and ≥ 30 kg/m², respectively. Abdominal obesity was defined as waist circumference (WC) values: ≥ 102 cm for men and WC ≥ 88 cm for women, respectively. Random blood glucose (RBG) values, measured using an Accu-Check glucometer classified pre-diabetes and diabetes as blood glucose levels: 140 – 199mg/dl and ≥ 200 mg/dL, respectively. Dietary habits assessed as food preferences, meal skipping and snacking patterns were assessed using an adapted questionnaire. Physical activity (PA) was assessed using an adapted WHO global PA questionnaire and analysed using standard procedures. Smoking habit and alcohol consumption were

assessed using an adapted Prostate Cancer Transatlantic Consortium global instrument. Data were analysed using descriptive and inferential statistics. Statistical differences were determined at α 0.05.

RESULTS AND DISCUSSION

Mean age of civil servants in the study was 39.1 ± 7.7 years. About 58.8% were married and up to 61.6% attained at least secondary education. Chi-square test revealed that BMI ($p = 0.013$); marital status ($p = 0.013$) and snacking time ($p = 0.001$) related significantly with hypertension. There was a positive correlation between age and diastolic BP, ($R = 0.175$, $p = 0.003$). BMI was a positive predictor of hypertension (OR = 1.086; CI: 1.003 - 1.176; $p = 0.042$). Prevalent hypertension and its risk factors in this study indicate a possible cardiovascular disease burden among civil servants, and may act as a pointer to the health conditions of members of the whole community since workers constitute the microcosm of the society.

Table 1: Prevalence of hypertension and risk factors among Civil Servants in Abeokuta South Local Government Area

Variable	Male N (%)	Female (N %)	Total (N %)
Hypertension	50 (44.6)	62 (55.4)	112 (32.0)
Overweight	47 (32.4)	98 (67.6)	145 (41.4)
Obesity	13 (17.6)	62 (62.7)	75 (21.4)
Abdominal Obesity	1 (1.1)	94 (98.9)	95 (27.1)
Pre-diabetes	1(12.5)	7(87.5)	8(2.9)
Diabetes	7 (50.5)	7 (50.5)	14 (5.0)
Physical Activity			
Low	1 (5.6)	17 (94.4)	18 (5.1)
Moderate	68 (40.7)	99 (59.3)	167 (47.7)
High	67 (40.6)	98 (59.4)	165 (47.1)

CONCLUSION AND RECOMMENDATION:

Hypertension is a serious health problem among civil servants in the region, hence the need for proper assistance that guarantees sufficient access to healthcare and adoption of lifestyle behaviours consistent with prevention of common risk factors.

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Pattern of Fruit and Vegetable Consumption among Hypertensive Outpatients attending State Hospitals in Ogun State

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KEYWORDS: Fruit, Vegetables, Hypertension, Consumption

BACKGROUND:

The incidence of hypertension is rapidly increasing and this remains one of the major risk factors for cardiovascular diseases [1]. Diet modifications are essential in the prevention and control of hypertension. Information regarding the dietary pattern, especially the fruit and vegetable intake of hypertensive patients in Nigeria is scarce. There is little information about the consumption of fruits and vegetables among hypertensive patients in Ogun state. Dietary trials and observational studies have shown the effectiveness of increased consumption of fruits and vegetables in the management of hypertension [2, 3]. This study was therefore conducted to assess the pattern of fruit and vegetable consumption among hypertensive outpatients attending state hospitals in Ogun state.

MATERIALS AND METHOD: A descriptive cross-sectional design was used in this study. Purposive sampling was used to select hypertensive patients in the outpatients' clinics of to the state hospitals in Ogun state. A total number of 162 registered hypertensive outpatients attending the state hospitals were recruited into the study. A pre-tested, semi-structured questionnaire was used to obtain information on socio-demographic characteristics. Fruit and vegetable consumption was assessed using the 24hr dietary recall and food frequency questionnaire. Quantity of fruits consumed by the patients on the 24hr dietary recall was obtained and their weight equivalents were recorded using the food weighing scale. Household measures such as serving spoons and table spoons were used in estimating the quantity of vegetables consumed and their weight equivalents were obtained using the food weighing scale. Blood pressures of the last three clinic visits made by the patients were obtained from the hospital records and the mean of the reading was determined. Anthropometric characteristics (i.e. weight, height, Body Mass Index, Ideal Body Weight, Blood pressure readings (i.e. systolic and diastolic) were obtained and the mean of their last three blood pressure readings was calculated. Data collected were analyzed using descriptive and inferential statistics.

RESULTS AND DISCUSSION: Majority of the patients were between the ages of 60-69 years (33.3%) Majority of the patients fell in the category of stage 1 hypertension, and only few (3.7%) had normal blood pressure readings after three clinic visits. Fruit and vegetable consumption was very low among the patients, as only 30.9% met the WHO recommendation for fruit and vegetable intake. The consumption of vegetables was higher than that of fruits with a mean intake of 52.83g for fruits and 265.84g for vegetables per day Orange was the most consumed fruit on a daily basis among the patients, while waterleaf remained the most daily consumed vegetable. A major dietary recommendation in the prevention and control of hypertension is increased fruits and vegetable consumption, which, findings from this study revealed a low consumption among the patients.

Table 1: Fruit and Vegetable consumption pattern of respondents

VARIABLE	FREQUENCY	PERCENTAGE (%)
Favorite fruit		
Apple	23	14.2
Banana	12	7.4
Carrot	3	1.9
Cucumber	12	7.4
Garden egg	17	10.5
Local apple	1	0.6
Orange	41	25.3
Pawpaw	26	16.1
Pineapple	3	1.9
Water melon	17	10.5
How respondents eat their fruits and vegetables		
In-between meals and snacks		
As breakfast	72	44.4
As lunch	14	8.6
As dinner	13	8.0
With meals	4	2.4
	59	36.6
Barriers to fruits and vegetable consumption		
Finance	26	16.0
Availability	53	32.7
Induce stooling	2	1.2
Seasonal variations	2	1.2

CONCLUSION AND RECOMMENDATIONS

This study has revealed that fruit and vegetable consumption is very low among hypertensive patients in the state. Patients attending state hospitals in Ogun State need continuous education on the importance of including adequate amounts of fruits and vegetables in their daily diets. There is need for Nutritionists, Dietitians and other health care providers to develop strategic measures for promoting fruit and vegetable intake among Nigerian hypertensive patients.

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Awareness of Risk Factors of Cervical Cancer Among Female Undergraduates of Federal University of Agriculture, Abeokuta, Ogun State.

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KEYWORDS: Awareness, Cervical Cancer, Risk factors, Undergraduates

BACKGROUND:

Cervical cancer is the most common malignancy and a leading cause of cancer death worldwide. It is preventable and avoidable, but its incidence among women is increasing and, on the increase, mainly due to a lack of awareness of the associated risk factors. This study assessed the level of awareness of cervical cancer risk factors among female undergraduates of the Federal University of Agriculture, Abeokuta, Ogun State.

METHODS: The study involved a cross-sectional descriptive study of 400 female students of the Federal University of Agriculture, Abeokuta, Ogun State. Self-administered questionnaire was used to elicit information on socio-demographic characteristics and knowledge on cervical cancer from the respondents.

RESULTS AND DISCUSSION:

A total of 400 female undergraduates participated in the study. The age range is between 18-26years, with a mean age of 24.70 ± 2.9 years. This indicates that these students are in their sexually active ages, as also reported among undergraduates in Imo State (1). Most of the respondents (84.3%) are aware of cervical cancer, and this is in contrast with a study in Ogbomoso, with only 22.6% level of awareness (2). More than half (56%) have never heard of the human papillomavirus, while only 38.5% know about HPV screening. This showed that the respondents lack knowledge of HPV as a causative factor of cervical cancer, as corroborated in Ethiopia (3). It can be deduced that a low level of knowledge contributes to low screening uptake rates among females; this is worrisome as the most important way to prevent cervical cancer is blocking the HPV infection (4). Foul-smelling vaginal discharge (83.5%) and vaginal bleeding after sexual intercourse (68%) were mostly identified as symptoms of cervical cancer. Almost 70% knew pap smear as one of its early detection measures as against 26.2% in Makurdi (5). The sources of health information reported included television/radio (76.3%), internet (75.3%) and health workers (62%). This agrees with a study in Makurdi, where the primary source of students' information was mass media (Maanongun et al., 2017).

CONCLUSION AND RECOMMENDATION:

Conclusively, the students' awareness of cervical cancer risk factors was inadequate. This poor awareness could be due to a lack of health education programs related to cervical cancer, thus the need for ongoing University Education campaigns on the risk factors of cervical and other forms of cancers among undergraduates in higher institutions of learning.

Table 1: Cervical Cancer Awareness among the Respondents

Variables	Yes		No	
	N	(%)	N	(%)
Have you ever had heard of Cervical Cancer?	337	84.3	63	15.7
Have you ever had heard of Human Papilloma Virus (HPV)?	176	44.0	224	56.0
Have you ever had heard of Human Papilloma Virus (HPV) Screening?	154	38.5	246	61.5
Knowledge on warning signs and early detection				
Foul smelling vaginal discharge	334	83.5	66	16.5
Bleeding after sexual intercourse	272	68.0	128	32.0
Early detection measures				
Pap Smear test	275	68.7	125	31.3
Visual inspection of the cervix with acetic acid	151	37.7	249	62.3
Source of Health Information				
Television/Radio	305	76.3	95	23.8
Health Worker	248	62.0	152	38.0
Internet	301	75.3	99	24.7

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Adolescents Qualitative Insight on Food Choices and Diet Quality of School Food Environment

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KEYWORDS: Adolescents, food environment, food choices, Focus group discussion

BACKGROUND AND OBJECTIVE:

A healthy diet is essential in adolescence to meet increased requirements for energy and nutrients to achieve full growth potential, promote health and well-being, and optimal cognitive function, and reduce the risk of chronic diseases in adulthood (1). With about 5-8 hours daily learning and consumption of 35-40% of daily food intake within these hours, the school food environment has the potential to influence adolescents' food choice and diet quality (2). Yet, limited information is presently available in this area in Nigeria context. This study was aimed at determining adolescents' qualitative insight on food choices and diet quality of both the personal and external domains of the school food environment.

METHODOLOGY: This study adopted a mixed-method approach which involved: focus group discussions, key informant interviews and direct observations which were conducted in two selected Secondary Schools in Ibadan, Nigeria. Purposive sampling technique was used to select Ibadan North-East local Government Area, Ibadan and one Private Secondary School and one Public Secondary School for the study. A total of 96 in-school adolescents aged 10 - 19 years and 24 food vendors participated in the study. Eight focus group sessions (class and gender based) were conducted per school to assess the personal domains (accessibility, affordability, convenience, and desirability) of the school food environment. Key Informant Interviews were carried out among food vendors in and around the school environment and interviewer observations were done to assess the external domains (availability, food price, vendor properties, marketing & regulation) of the school food environment. Sessions were recorded, transcribed verbatim and analysed using the NVIVO software version 10.

RESULTS AND DISCUSSION: Among the students, 50.0% were male and 59.4% were aged 10-14 years. For the food vendors, 87.5% were female, 33.3% were aged 40-49 years and 29.2% were 30-39 years. Varieties of unhealthy foods abound in the school food environment while healthy options were not easily available. Major influencers of personal domain of the school food environment and food choice include working hours of food vendors, school lessons, price, quantity, satiety, and organoleptic properties of the foods. Other factors were peer influence, cleanliness of the vendor, preparation and vending environment, the student's mood, and the food familiarity. Identified strategies to promote healthy school food environment include restricted access and sales of unhealthy foods, increasing access to variety of healthy foods, ensure affordability, prevent encroachment of lunch break period with classes/school lessons during lunch break, enforcing vendors' personal and environmental hygiene, mandatory periodic training and re-training for all school food vendors, and regular inspection of school food canteens by government health inspectors. The results showed that there is a high demand for fast foods and high-calorie foods by the students, which prompts food vendors to stock them in their shops, only few sold fruits and vegetables, this

finding is consistent with an Indian study where they found there is a variety of unhealthy foods available in school food canteens inside the school (3).

CONCLUSION AND RECOMMENDATION:

The external domain has effects on the personal domain of the school food environment and vice versa, though some aspects of the food environment like personal preferences cannot be changed, these factors can be influenced. Written laws that are strictly implemented can influence availability, accessibility, food price, vendor and product properties, marketing, advertisement, and regulations. This will help to create a healthy food environment that will lead to healthy food choices by adolescents.

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PC11

Nutritional Status and Micronutrients Adequacy in Egbeda Local Government Area, Ibadan, Oyo State

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KEYWORDS: Nutritional status, Anthropometric characteristics, Nutrient Adequacy, Elderly

BACKGROUND AND OBJECTIVES:

Nutritional problems that occur in the elderly arise due to wrong eating behavior which is an imbalance between nutrient intake and recommended nutritional adequacy (Nasution et al., 2021). It is accompanied by an increased likelihood of suffering from one or more chronic diseases affecting appetite, leading to altered food intake and impairment of nutritional status (Leslie and Hanky, 2015). The study was designed to assess the personal characteristics, anthropometric characteristics, dietary intake and micronutrients adequacy among elderly.

MATERIALS AND METHOD

The study was performed on 300 respondents in Egbeda Local Government Area, Ibadan using a systematic sampling method. Pre-tested questionnaires were administered by trained interviewers to collect data on personal characteristics and anthropometric data and anthropometric data of respondents were also collected; 1 day 24-hour dietary recall questionnaire was administered to gather information on their nutrient intake from which nutrient adequacy ratios were computed using the Nutrisurvey software. Data was analyzed using descriptive statistics and inferential statistics which were used to establish relationship and associations. Data entered was obtained using SPSS software version 20.0.

RESULTS AND DISCUSSION

The mean weight and height of the respondents are 70.16 ± 12.09 and 25.74 ± 4.25 respectively. Among the respondents, 4.1% were underweight, 39.1% had normal weight, 42.8% were overweight and 14% were obese. Respondents had inadequate consumption of Vitamin A (75.8%), and folic acid (75.9%) which revealed less than 60% RDA. 100% and 94.3% of the respondents consumed more than 80% RDA of iron and zinc. It has been suggested that respondents should be careful of iron poisoning due to excess intake of these nutrients¹ among both gender. Using the chi-square analysis set at a p-value of ≤ 0.05 , the result revealed that there was significant relationship between their body mass index and some nutrient. It can be concluded that a large number of the respondents had poor nutritional status.

Nutrient Intake Adequacy of Male Respondents

Nutrients	RDA	NAR (%)	Inadequate N(<60% of RDA)	Adequate N(60-80% of RDA)	Excess N(>80% of RDA)
Energy (Kcal)	2000	258.12	4 (2.5)	6 (3.8)	148 (93.7)
Protein (g)	100	218	9 (5.7)	7 (4.4)	142 (89.9)
Fats (g)	56	216	10 (6.3)	6 (3.8)	142 (89.9)
Carbohydrates (g)	275	295	2 (1.3)	3 (1.9)	153 (96.8)
Dietary fibre (g)	28	114	37 (23.4)	17 (10.8)	158 (100)
Vitamin A (mg)	900	18	119 (75.3)	3 (1.9)	36 (22.8)
Calcium (mg)	1200	76	71 (44.9)	12 (7.6)	75 (47.5)
Iron (mg)	8	483.13	1 (0.6)	1 (0.6)	158 (100)
Folic acid (mg)	400	27.63	120 (75.9)	10 (6.3)	28 (17.7)
Potassium (mg)	4700	70.88	68 (43.0)	17 (10.8)	73 (46.2)
Zinc (mg)	11	255.36	4 (2.5)	5 (3.2)	149 (94.3)

CONCLUSION AND RECOMMENDATIONS

This study shows double burden of malnutrition among the respondents, also, their BMI may be greatly influenced by their nutrient intake. Therefore, assessment of nutritional status of elderly helps to detect malnutrition at an earlier stage, and early corrective interventions can improve their nutritional status. There should be proper monitoring during the ageing process by focusing on their nutrition, so as to reduce the observed prevalence of malnutrition.

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PC13

Nutrients, Antinutrients and Phytochemical Composition of Roasted Groundnut (*Arachis hypogea* L) Nut and Skin

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KEYWORDS: Roasting, groundnut skin, Proximate

BACKGROUND AND OBJECTIVES:

Groundnut (*Arachis hypogaea* L.) is a food source with great nutritional and health functions. It is the most widely consumed legume globally due to its nutrition, taste, and affordability^[1]. When roasted, the skin is discarded regardless of the fact that it is consumed together with the seeds if boiled. This study compared the nutritional, antinutritional and mineral content of roasted groundnut with and without the skins, as well as determined the phytochemical and mineral contents of the skin alone. The findings from this research could encourage the better utilization and maximization of the nutritional benefit of groundnut.

MATERIALS AND METHODS:

Groundnut seeds were purchased from Samaru market, Zaria, identified and authenticated at Ahmadu Bello University herbarium and a voucher number (ABU01577) deposited. It was sorted, washed, air dried, and then roasted in the oven (Thermo Scientific Precision™ Compact oven 1.7 Cu. Ft. 120V, Institute for Agricultural Research Ahmadu Bello University, Zaria), at 60°C for three hours. Cooled roasted samples were divided into two; one part was peeled to remove the skins, the other was left unpeeled. The skins alone formed the third part. The three samples were ground and standard methods were used for all analysis: proximate parameters^[2], minerals^[3] Phytate^[4] Oxalate^[5], Tannin^[6] phytochemicals^[7,8,9]. Results are presented

as mean \pm standard deviation of two determinations. Statistical analysis was done using SPSS version 23. Student's t- test was used to compare the means and p values less than 0.05 was considered significant.

RESULT AND DISCUSSION

Table 1: Proximate Composition of Roasted Unpeeled and Peeled Groundnut (*Arachis hypogea*)

Parameters (%)	Groundnut	
	With Skin	Without Skin
Moisture	0.78 \pm 0.11 ^a	0.75 \pm 0.71 ^a
Ash	2.40 \pm 2.03 ^a	2.03 \pm 0.64 ^b
Crude Lipid	51.25 \pm 0.49 ^a	53.8 \pm 0.14 ^a
Crude Protein	27.13 \pm 1.24 ^a	17.54 \pm 0.05 ^b
Crude Fibre	15.48 \pm 0.60 ^a	11.00 \pm 0.28 ^b
Carbohydrate	18.83 \pm 0.61 ^b	25.52 \pm 1.44 ^a

Values are represented as mean of duplicates \pm standard deviation. Values with the same superscript across a row are not significantly different.

Proximate analysis gives an overview of the nutritional content of foods. The ash, crude protein and crude fibre contents were significantly higher ($p < 0.05$) in the unpeeled sample. The higher ash content shows that groundnut skin contributes to the bulk of the mineral constituent of groundnut, hence could confer a better nutritional advantage to consumers. The higher ($p < 0.05$) values for crude protein and crude fibre observed further indicates that consumption of roasted groundnut with the skin would aid better growth (in children) and repair of worn out tissues, as well as aid in regular bowel movement. Moisture content was higher for unpeeled samples although not significant ($p > 0.05$). This probably shows that both samples might have similar shelf life. Crude lipids were higher in the peeled sample, although not significant ($p > 0.05$), showing that both samples would equally provide healthy calories to malnourished infants and children when consumed. Carbohydrate was significantly ($p < 0.05$) higher in the peeled samples. This could be due to the method used as this was determined by difference.

CONCLUSION AND RECOMMENDATION:

Roasted groundnut when unpeeled confers higher, and comparable nutritional benefits. Therefore to maximize this benefit, its consumption is highly recommended.

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Healthy Eating Index and Dietary Pattern of Consumers of Franchised Fast-Foods in Three Metropolitan Cities in Southwest Nigeria

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KEYWORDS: Healthy Eating Index, Franchised, Fast food, Nutritional Status

BACKGROUND AND OBJECTIVE:

The world we live in is changing constantly; everyone is getting busier in order to make ends meet. Families and individuals hardly have time to prepare nutritious meals (1). People prefer to eat out often, foods offered by these out-door settings or food vendors are usually not balanced in terms of nutrients. They therefore impact negatively on the nutritional status of the regular consumers of such foods. The Study aimed to investigate Healthy Eating Index and dietary pattern (consumers) of franchised fast food in three south-west state of Nigeria.

MATERIAL AND METHOD:

Three Hundred respondents were randomly selected for this study. The sample size was determined using the following formula: $n = z^2 p (1 - P / X^2)$. Since the sample population was large (i.e. $n > 30$) an acceptable margin of error (Z) of 1.96 at 95% Confidence interval is used. A total of three hundred respondents were assessed using questionnaire. This was subdivided into six sections such as socio demographic of the respondent. These are the character of the respondent, Lifestyle, franchised food consumption pattern, food frequency consumption pattern, physical activities and history of some disease using different instruments including biochemical information from the respondents. The states' capitals (Ibadan, Abeokuta, and Ikeja) were picked during the study which comprises of young and old, male and female ranging from low to high socio-economic status. The Healthy Eating index was analyzed by using a food frequency questionnaire which was slightly modified to suit the study and its result were multiplied by portion size and nutrient density. The data collected is analyzed using Statistical Package for Social Sciences (SPSS) window 23 versions to find simple percent and chi-square.

RESULTS AND DISCUSSION

The study revealed that not less than 83.3% of the respondents consumed fast food once/twice/thrice a day,

54.0% snack often, only 13.3% visit franchised fast food for local food, 19.3% had normal BMI while others were overweight (33.3%) and Obese (47.4%), 4.0% practice healthy eating habit (3). The study also showed that 42.75% consume fast food daily. There was no significant difference between HEI and fast-food consumption while there was significant difference between blood pressure of respondents and fast-food consumption. The dietary life style of the respondents were not good, only 4.0% HEI analysis was found to practice healthy eating habit, this is an indication that dietary habit of the respondents were poor. The data revealed that patronage is increasing daily and most visiting (54.0%) ordered for snacks such as pie, dough nut, roasted animal products as well as dairy products which are linked to increase risk of heart disease.

CONCLUSION AND RECOMMENDATION:

In conclusion, healthy eating index is a maker of quality of life and healthy living, and good nutrition and healthy lifestyle practice produce a good quality of life and longevity. Therefore, there should be regulation and strict monitoring of franchised fast-food industries for production of healthy foods.

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PC15

Effect of Processing on Proximate, Anti-Nutrient and Amino Acid Profile of Three Food Products from Soya Bean (*Glycine Max*)

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KEYWORDS: Nutritional value, Processed products, Soya bean

BACKGROUND AND OBJECTIVES:

Soya bean (*Glycine max*) with a high protein content and balance of amino acids has the potential of alleviating malnutrition problem in Nigeria and improve the nutritional status of children consuming it^[1]. Increase in population has resulted to food insecurity due to low ratio in food production to population

growth, in addition to poor food processing and management techniques. Hence, determining the nutritional value of food products processed from soybean will shed more light on the effect of processing on these products, increase food choices and reduce malnutrition.

MATERIALS AND METHODS:

Soya bean seeds were purchased from Samaru market, Zaria, identified and authenticated at Ahmadu Bello University herbarium and a voucher number (01923) deposited. Three food products were prepared and standard methods were used for all analysis; proximate parameters^[2], Phytate^[3], Oxalate^[4], Tannin^[5], and amino acid profile^[6]

RESULT AND DISCUSSION

Proximate analysis gives an overview of the nutritional content of foods. Tofu commonly known as "awara" by the Hausas in Northern Nigeria, had significantly ($p < 0.05$) higher moisture (21.55 ± 0.64) and lipid (23.15 ± 0.49) content, this indicates that its shelf life might be low when compared to Tom brown (3.97 ± 0.11). Crude protein was significantly ($p < 0.05$) higher in soymilk (57.24 ± 0.11), this shows that this product could be a better choice when protein intake is paramount. Crude fibre was not detected in all the products, this could be because the grinded soybean (wet grinded for tofu, and soymilk) and Tom brown (dry grinded after roasting) were sieved. This procedure would have excluded crude fibre as they would constitute the residue after sieving. These products may not be suitable when foods that gives a sense of fullness after consumption, and also increases bowel movement are sort. The higher ($p < 0.05$) carbohydrate (30.41 ± 0.23) content observed in Tom brown could be attributed to the fact that losses due to soaking, heated and prolonged boiling in water were not part of its processing procedure unlike the other products.

Table 1: Effect of Processing on the Proximate Parameters of Three Food Products from *Glycine max*

	Moisture	Ash	Crude Lipid	Crude Protein	Carbohydrate	Crude fibre
Tofu	21.55 ± 0.64^c	ND	3.20 ± 0.49^b	23.15 ± 0.49^c	50.75 ± 0.13^b	1.35 ± 0.50^b
Soymilk	20.30 ± 0.31^b	ND	1.55 ± 0.21^a	20.91 ± 0.13^b	57.24 ± 0.11^c	0.00 ± 0.00^a
Tom Brown	3.97 ± 0.11^a	ND	4.95 ± 0.64^c	18.10 ± 0.57^a	42.57 ± 0.07^a	30.41 ± 0.23^c

Values are presented as mean \pm SD of the three determinations. Means with different superscript down the column are significantly different ($p < 0.05$). ND: Not Detected

CONCLUSION AND RECOMMENDATION:

Processing foods into more than one product creates varieties that confers different levels of nutritional advantage to the products. Tofu contained higher ($p < 0.05$) moisture and crude lipid, Tom brown contained higher ($p < 0.05$) ash and carbohydrate while soya milk contained higher ($p < 0.05$) crude proteins. This findings will aid consumers make better choices of the kind of soya bean product to consume depending on their nutritional needs. Overall, increased consumption of tofu is recommended.

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OC16

Assessment of Body Mass Index (BMI) and Fasting Blood Glucose Level of Students in Federal Polytechnic Ilaro, Ogun State.

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KEYWORDS: Body mass index, Fasting blood glucose, adolescents, young adults.

BACKGROUND AND OBJECTIVES:

The prevalence of overweight and obesity is increasing and obesity has reached epidemic proportions globally, with an estimated 2.8 million people dying each year as a result of being overweight or obese (1). Obesity is a known risk factor for type 2 diabetes (2). Diabetes is a major health problem affecting many people that constitute the workforce. This in turn has deleterious effect on the national productivity and economy. The prevalence of type 2 diabetes in adolescents and young adults is dramatically increasing; nearly 1 in 5 adolescents between the ages of 12 – 18 years and 1 in 4 young adults aged 19-34 years, are living with prediabetes (3). The present study therefore, assessed the Body Mass Index (BMI) and Fasting Blood Sugar Level of Students in Federal Polytechnic, Ilaro Ogun State.

METHODOLOGY

The study is descriptive cross-sectional survey conducted among 200 students randomly selected from 3 schools (faculties) of The Federal Polytechnic Ilaro, Ogun State. A semi-structured and interviewer administered questionnaire was utilised to obtain data from the respondents. Fasting blood glucose, weight and height were determined using glucometer, weight scale and height metre respectively, and results were classified using reference standards. Data analysis was done using SPSS version 20.0.

RESULTS AND DISCUSSION

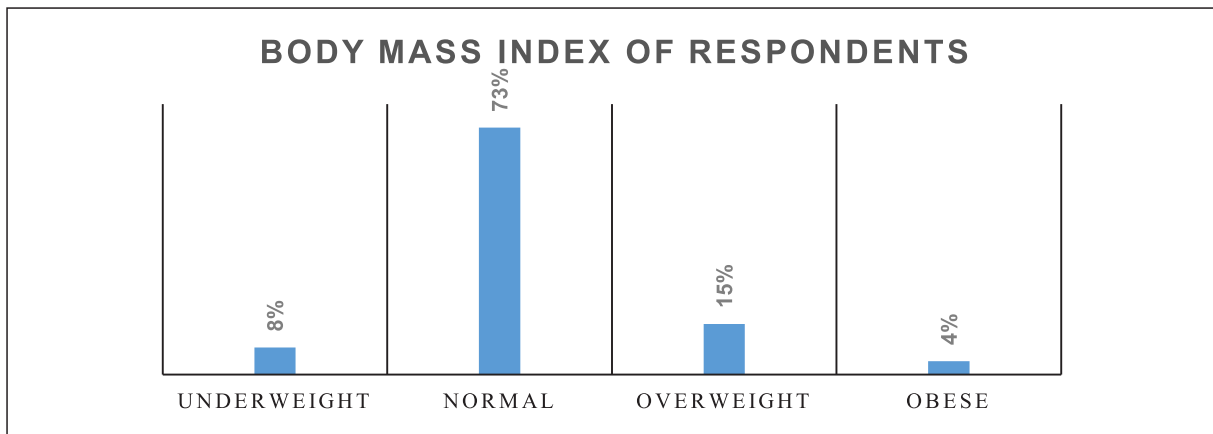


Figure 1: Body mass index (BMI) of the respondents

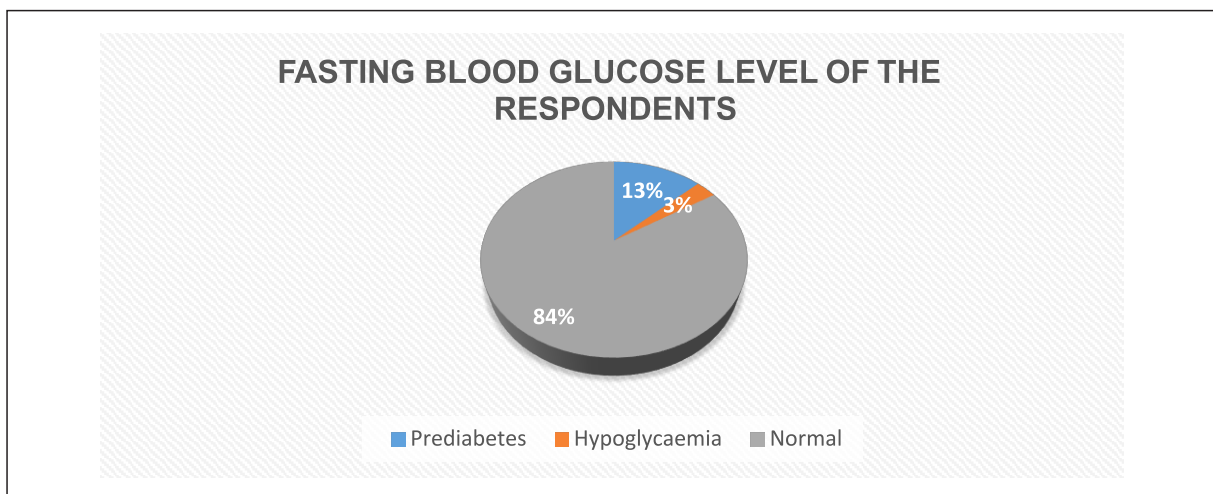


Figure 2: Fasting blood glucose level of the respondents

The BMI of the respondents shows that only few of the respondents were obese (4.0%), while a larger percentage of them were normal (73.0%) and few of them were underweight and overweight (16.0%, 15.0%) respectively. Furthermore, the fasting blood sugar result of the respondents shows that small percentage of them had hypoglycemia and pre-diabetes (3.0% and 13.0%) respectively. The result for overweight and obesity in this study is lower than that of Nupo *et al.* (4) while the result of fasting blood glucose corresponds to that of (4) except hypoglycemia. The difference in the prevalence of overweight and obesity in this study may be attributed to difference in study area and socio-economic status as obesity is believed to be the disease of the affluent.

CONCLUSION AND RECOMMENDATION

Majority of the respondents had a normal FBG while others had prediabetes (13%) and hypoglycaemia (3%) respectively. Body mass index of the subject revealed that there was high prevalence of overweight (15%) among the respondents. Nutrition education should be given to undergraduates on the risk of obesity and type 2 diabetes.

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PC17

Consumption Pattern, Activity Level and Nutritional Status of Consumers of Franchised Fast Food in Three South-West State of Nigeria

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KEYWORDS: Activity level, Franchised, Fast food, Nutritional Status

BACKGROUND AND OBJECTIVES:

We are in the age where globalization effects have seriously impacted the food system and consumption pattern of the world population. Franchised Fast food has become an alternative or even the only option of some people who could not afford to cook after a stressful day at work. Fast food consumption has been reported to be one of the major causes of obesity which is a disease that opens door for other non-communicable diseases. Active lifestyle has being seen to be an important factor for weight management, while sedentary lifestyle may cause malnutrition. Sedentary lifestyle and less of physical activity has being known to be an independent risk factor for chronic diseases, and has been estimated as the leading cause of

death globally (1). This study aimed at understanding the association between consumption pattern, nutritional status and activity level of consumer of franchised fast food in three south-west state of Nigeria.

MATERIAL AND METHOD:

Three Hundred respondents were randomly selected for this study. The sample size was determined using the following formula: $n = z^2 p (1-P / X^2)$. Since the sample population was large (i.e. $n > 30$) an acceptable margin of error (Z) of 1.96 at 95% Confidence interval is used. A total of three hundred respondents were assessed using questionnaire. This was subdivided into six sections such as socio demographic of the respondent. These are the character of the respondent, Lifestyle, franchised food consumption pattern, food frequency consumption pattern, physical activities and history of some disease using different instruments including biochemical information from the respondents. The states' capitals (Ibadan, Abeokuta, and Ikeja) were picked during the study which comprises of young and old, male and female ranging from low to high socio-economic status. Respondent's activity level were measure using WHO activities duration and classification. The data collected is analyzed using Statistical Package for Social Sciences (SPSS) window 20 versions to find simple percent, chi-square and correlation.

RESULTS AND DISCUSSION:

The result of the study show that majority of the respondents were females 56.7% while males were 43.3%. Many of the respondents had first degree 47.3%, Post graduate 25.3%, Secondary 24.0% and minority completed primary education 3.3%. The study report of the employment status of the respondents shown that majority 36.7% of the respondents are home maker, 26.0% are civil servant, 20.0% are working with private sector, 16.0% of the respondents engaged themselves, and 0.7% was unemployed. Greater percentage of the respondents (40.7%) consumed franchised fast food 4 to 5 times in a week, (38.0%) consumed franchised fast food 2 to 3 times, (16.0%) consumed franchised fast food less than two times, and 5.3% consumed franchised fast food more than six times a week. Majority of the respondent were overweight (33.3%), 26.7% of the respondents fall between obesity grade 1 and 14.7% were classified under obesity grade II while 6.0% were classified under Grade III obesity..It also indicated that majority of respondents were hypertensive (40.0%), While 25.3%, 14.0% and 0.7% were pre-hypertensive, normal, hypotension respectively. The aforementioned results consolidated the studies that revealed that franchising is one of the key forms of global expansion and entrance into foreign markets for international businesses, with millions of franchisees worldwide (2). The study also indicated the level of intake of vegetables, 19.3% usually take vegetable more often, 4.7% take it more than seven times a week, 0.7% take daily, 24.7% take it between six to seven times, 12.0% between four to five times, 16.0% between two to three times a week while 12.7% take it rarely. Majority of the respondents were either sedentary (40.7) or less active (14.7). The study shows that 44.4% of the respondents that were hypertensive are sedentary while only 27% of them were very active. Only 8.5% of the women have lean, 37.8% were having excess fat and 9.8% were classified under high body fat (2). Majority (83.1%) of the male falls under high body fat and only 1.7% were classified as moderately lean. The chi-square result shows that there is no association between the activities level of the respondents and their body fat classification.

CONCLUSION AND RECOMMENDATION:

It can be conclude that majority of the urban dwellers in the three states capital consumed more of franchised fast food. More than half of the population that consumed franchised fast food are educated. There is no relationship between the activity level and body mass index of the residents of the three states. It was discovered in the study that none of the men that patronized the franchised fast food falls to normal Waist to Hip Ratio, Body Mass Index and % Body fat. More research work may be carried out to ascertain the effect of physical activity on the anthropometric index of consumer of franchised fast food. Therefore, there is a need for further findings on the theory that explain this. There should be regulatory body that will spearhead the monitoring for compliance of franchised fast-food industries to standard specification for the production of healthy foods.

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PC18

Growth performance, biochemical, hematological parameters and histopathological studies of Sprague Dawley rats fed OFSP supplemented leaves diet.

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KEYWORDS: *In vivo* potentials of OFSP leaves

BACKGROUND AND OBJECTIVES:

Orange-fleshed sweet potato is a biofortified root crop whose green leafy vegetables can be incorporated into meals because of its inherent nutrients and importance in food security. Despite these benefits, there is paucity of information on the biochemical effects of OFSP leaves *in vivo*. This research was carried out to assess the effect of feeding OFSP leaves on some hematological, biochemical, and histopathological parameters in experimental rats.

MATERIALS AND METHODS Thirty experimental rats were randomly assigned to five groups fed with different concentrations of control diet, 25%, 50%, 100% of dried OFSP leaves supplemented diet and 100% 'pumpkin' leaf diet for six weeks. The body weight, feed consumption and conversion ratio, hematological, biochemical, and histopathological examinations of some organs were compared between the rats fed the control diet, supplemented OFSP and 'pumpkin leaves'

RESULTS AND DISCUSSIONS: Feeding experimental rats with OFSP leaves increased the body weight, growth rate, food consumption and conversion. There were no histological changes of the various organs assessed. The serum levels of superoxide dismutase, glutathione peroxidase antioxidant enzymes, hematological findings (hemoglobin, red blood cells and hematocrit) values showed significantly higher $P \geq 0.05$ values compared to those obtained for pumpkin leaves (Ugwu). The values of Albumin and total protein were unaltered.

CONCLUSION AND RECOMMENDATION(S):

OFSP leaves are easily cultivated in Nigeria with enormous benefits. The results obtained indicate that the OFSP leaves have the potentials to support growth and can be utilized as a functional food.

Table 1. The effect of OFSP leaves supplemented experimental diets (0%, 25%, 50%, and 100%), and their effects on the body weights, food consumption, antioxidant enzymes and biochemical parameters in Sprague Dawley rats. Results are represented as mean \pm standard deviation of triplicates. Means with different letters within a row are significantly differ ($p \leq 0.05$). All values are on dry weight basis

Parameters	Experimental groups				
	Control 0% OFSP Leaves	25% OFSP Leaves	50% OFSP Leaves	100% OFSP Leaves	100% Pumpkin Leaves
Growth performance and nutrient utilization					
Initial body weight (g)	133.33	129.50	138.67	118.67	128.17
Final body weight (g)	191.17	192.33	195.67	189.33	189.17
Weight gain (g)	57.84 ^b	62.83 ^b	57.00 ^b	70.66 ^c	61.00 ^b
Food consumption	6278	6282	6280	6285	6284
Food conversion	110	101	106	89	103
Hematological Parameters					
Red blood cells ($10^6/\mu\text{L}$)	7.15 \pm 0.20 ^a	7.59 \pm 0.26 ^a	7.39 \pm 0.20 ^a	7.14 \pm 0.25 ^a	6.39 \pm 0.42 ^b
Haemoglobin(g/dL)	14.38 \pm 0.58 ^c	15.58 \pm 0.69 ^c	14.78 \pm 0.54 ^c	14.12 \pm 0.65 ^c	12.98 \pm 1.04 ^d
Haematocrit (%)	40.68 \pm 1.32 ^f	41.08 \pm 1.49 ^f	39.63 \pm 1.01 ^f	39.23 \pm 1.56 ^f	37.12 \pm 2.86 ^h
Serum Biochemical analyses					
Superoxide dismutase ($\times 10^2$ U/ml protein)	2.288 \pm 0.20	1.783 \pm 0.30	3.887 \pm 0.60	4.103 \pm 0.30	3.488 \pm 0.03
Glutathione peroxidase (U/ml protein)	2.030 \pm 0.03 ^b	1.977 \pm 0.07 ^b	2.308 \pm 0.05 ^a	2.347 \pm 0.02 ^a	2.278 \pm 0.008 ^a
Total protein	7.533 \pm 0.20 ^k	7.500 \pm 0.30 ^k	6.600 \pm 0.40 ^k	6.683 \pm 0.30 ^k	7.167 \pm 0.10 ^k
Albumin	3.717 \pm 0.10 ⁱ	3.533 \pm 0.20 ⁱ	3.033 \pm 0.10 ⁱ	2.967 \pm 0.09 ⁱ	3.383 \pm 0.10 ⁱ

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PC19

Nutritional assessment, sensory quality and stability of sugar-free composite jam enriched with dates and turmeric powder

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KEYWORDS: Sugar-free, Composite jam, dates, turmeric.

BACKGROUND AND OBJECTIVES:

Micronutrient deficiency also known as 'hidden hunger', is a nutritional challenge in developing countries especially in Africa (1). Recently, the Global Burden of Disease Analysis estimated that every year, 4.9 million deaths are associated with low fruit intake and 1.8 million were attributable to inadequate vegetable intake (2). Fruits and vegetables, including orange, mango and African star apple are good sources of micronutrients. Processing of the fruits and vegetables into finished products such as jam, provides convenience, extends their shelf life, and makes them more available for consumers. Health hazards linked to the use of sweeteners in foods have led to a change in consumers' preferences for the use of alternative low-calorie natural sweeteners (3). Dates are known for their pleasant, sweet taste and contain nutrients such as vitamins, minerals, dietary fibre and phenolic compounds (4). Curcumin is the major biologically active polyphenolic constituent in turmeric (5). Curcumin exhibits a wide range of beneficial effects including anti-inflammatory, antioxidant, and chemoprotective properties (5). This study aimed to produce a sugar-free composite jam from the blend of orange, mango and African star apple enriched with dates and turmeric powder; and determine the nutritional and sensory qualities as well as the stability of the product under different conditions of storage.

MATERIALS AND METHODS:

Jam was made from orange, mango and African star apple using the open kettle method (DeGregorio and Cante, 1992). Different blends of orange, mango and African star apple pulps were prepared in the following proportions: 50:25:25%; 25:50:25%; 25:25:50%; and 33.33:33.33:33.33% respectively, to produce four products. All the products were enriched with 15 g each of dates and turmeric powder. A commercially obtained sample CTR (mixed-fruit jam) was used as the control. All the samples were analysed for proximate composition, pH, mineral profile, Vitamins A, C and E, antioxidant activity using standard methods. Total plate counts of the samples during storage at room and refrigeration temperatures were recorded weekly for four weeks. Sensory (taste, colour, flavour, texture, spreadability) analysis of all jam samples was conducted using a 9-point hedonic scale, with sixty untrained panelists who regularly consume fruit jam. Simple paired comparison test was further conducted with the most preferable sample and a regular market sample.

RESULTS AND DISCUSSION:

A major micronutrient, Vitamin A, was significantly ($p \leq 0.05$) higher in jam made from 25% African star apple, 50% mango and 25% orange pulps at 0.18 IU/100 g but with a significantly ($p \leq 0.05$) lower iron content (0.19 ppm) compared to the control sample (0.72 ppm). Sensory evaluation showed significantly ($p \leq 0.05$) higher organoleptic properties in the sample. Total plate counts of all the samples increased during storage at room (1.8-5.3 \log_{10} CFU/g) and refrigerated (1.8-3.3 \log_{10} CFU/g) temperatures, although no visible signs of spoilage was observed. Results obtained show significant ($p \leq 0.05$) differences in nutritional, and sensory qualities of the samples. The addition of dates and turmeric powders possibly mitigated microbial spoilage in the samples.

Table 1. Vitamin content of jam blends from mango, orange and African star apple

Sample	Vitamin A (IU/100g)	Vitamin C (mg/100g)	Vitamin E (mg/100g)
AIZ	0.17 ^b ± 0.00	0.04 ^b ± 0.00	0.03 ^a ± 0.00
B2Y	0.12 ^c ± 0.00	0.04 ^c ± 0.00	0.03 ^c ± 0.00
C3X	0.18 ^a ± 0.00	0.05 ^a ± 0.00	0.03 ^b ± 0.00
DW4	0.12 ^c ± 0.00	0.04 ^{bc} ± 0.00	0.03 ^b ± 0.00
CTR	0.06 ^d ± 0.00	0.02 ^d ± 0.00	0.01 ^b ± 0.00

Data are mean values of triplicate determinations ± standard deviation. Mean values carrying the same superscript along columns are not significantly different ($p > 0.05$). AIZ= 50% orange, 25% mango, 25% African star apple; B2Y= 25% orange, 25% mango, 50% African star apple; C3X= 25% orange, 50% mango, 25% African star apple; DW4= equal amounts of orange, mango and African star apple. All the samples were enriched with 15 g each of dates and turmeric powder; CTR 'control sample' is a commercially obtained mixed fruit jam.

CONCLUSION AND RECOMMENDATIONS:

Fruit jam made from African star apple, mango and orange pulps enriched with dates and turmeric powder provides significant percentage of the recommended dietary allowance of micronutrients, vitamins and minerals, required for healthy living. Extended storage study is recommended to determine possible changes in nutritional and sensory qualities of the product.

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PC20

Association between Physical Activity Level, Socio-demographic and Economic Characteristics of Elderly's in Abeokuta Metropolis, Ogun State, Nigeria

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KEYWORDS: Physical Activity, Socioeconomic and demographic Characteristics.

BACKGROUND AND OBJECTIVES:

The World Health Organization generally applies 60 years and over as a statistical cut-off for old age. Overweight and obesity are global problems that are increasing at an alarming and uncontrollable rate. Overweight and obesity are associated with numerous comorbidities of great public health concern. It is worth noting that low physical activity might predispose an individual to become overweight and obese. This study assesses the physical activity, socio-demographic and economic characteristics of elderly's residing in Abeokuta metropolis.

MATERIALS AND METHOD:

This present study was descriptive and cross-sectional. A total of 300 participants were used for this study. A structured questionnaire was used to obtain socio-demographic and economic characteristics of the respondents. The physical activities of the respondent were evaluated and categorized using the International Physical Activity Questionnaire guide. The data obtained were coded and analyzed using Microsoft Excel 2019 and Statistical Package for Social Science (version 23). The association between the variables were determined using Chi Square Test.

RESULTS AND DISCUSSION:

Results presented in Table 1 revealed a significant association ($P\text{-value} \leq 0.05$) between the respondents' age, education level, monthly income and physical activity level. This finding is similar to the study of (1), which identified some socio-demographic variables associated with increased sedentary lifestyles.

Table 1: Association between Physical Activity, Socio-demographic, Economic Characteristics and Physical Activity of the Respondents

Variable	Physical Activity Level						Total	χ^2	P value	
	Low		Moderate		High					
	F	%	F	%	F	%	F	%		
Age										
60 – 70	17	5.7	140	46.7	45	15.0	202	67.3	40.586	0.000
71 -80	5	1.7	42	14.0	17	5.7	64	21.3		
81 -90	15	5.0	19	6.3	0	0.0	34	11.3		
Gender										
Male	12	4.0	93	31.0	31	10.3	136	45.3	3.101	0.212
Female	25	8.3	108	36.0	31	10.3	164	54.7		
Ethnicity										
Yoruba	28	9.3	176	58.7	51	17.0	255	85.0	8.992	0.174
Igbo	5	1.7	15	5.0	7	2.3	27	9.0		
Hausa	1	0.3	6	2.0	0	0.0	7	2.3		
Other	3	1.0	4	1.3	4	1.3	11	3.7		
Marital Status										
Single	0	0.0	1	0.3	0	0.0	1	0.3	12.241	0.269
Cohabiting	0	0.0	1	0.3	0	0.0	1	0.3		
Married	26	8.7	161	53.7	57	19.0	244	81.3		
Separate	0	0.0	5	1.7	0	0.0	5	1.7		
Divorced	1	0.3	2	0.7	1	0.3	4	1.3		
Widowed	10	3.3	31	10.3	4	1.3	45	15.0		
Education Level										
None	7	2.3	37	12.3	10	3.3	54	18.0	28.999	0.010
PSC	7	2.3	36	12.0	13	4.3	56	18.7		
SSCE	15	5.0	62	20.0	19	6.3	96	32.0		
NCE	1	0.3	26	8.7	1	0.3	28	9.3		
OND	0	0.0	6	2.0	5	1.7	11	3.7		
HND	4	1.3	10	3.3	7	2.3	21	7.0		
Bachelors	1	0.3	23	7.7	7	2.3	31	10.3		
Masters	2	10.7	1	0.3	0	0.0	3	1.0		
Monthly Income										
No Income	4	1.3	4	1.3	1	0.3	9	0.3	54.744	0.000
N5000-9999	5	1.7	14	4.7	1	0.3	20	0.3		
N10000-14999	9	3.0	26	8.7	11	3.7	46	15.3		
N15000-19999	3	1	38	12.7	6	2.0	47	15.7		
N20000-24000	4	1.3	35	11.7	6	2.0	45	15.0		
N25000-29999	2	0.7	17	5.7	13	4.3	32	10.7		
N30000-34999	0	0.0	13	4.3	9	3.0	22	7.33		
N35000-39999	5	1.7	11	3.7	5	1.7	21	7.0		
N40000-44999	2	0.7	9	3.0	8	2.7	19	6.3		
N45000-49999	0	0.0	4	1.3	0	0.0	4	1.3		
>50000	3	1.0	30	10.0	2	0.7	35	11.7		

CONCLUSION: This observed association shows that educational level attained, income, physical activities and age might make an elderly individual prone to overweight and obesity.

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PC21

Nutrient Composition And Physical Properties Of Local And Improved Cultivars Of Pearl-Millet (*Pennisetum Glaucum*) Flour

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KEYWORDS: *Pennisetum glaucum*, Super-sosat, Ex-bornu, Zango, Local and Improved cultivars

BACKGROUND AND OBJECTIVES:

Good nutrition is a basic human right. However, most nutrients from commonly consumed foods are lost due to the processing methods used. Thus, the relationship between food, nutrition and health should be reinforced through improvement in the processing methods.

MATERIALS AND METHODS: The cultivars used were *Zango*, *Ex-bornu* and *Supper-sosat*. Proximate composition, carbohydrate fractions, energy values, vitamins, minerals, functional properties, dietary fibre, antinutrient were analysed using standard methods.

RESULTS: *Super-sosat* cultivar flour significantly ($p < 0.05$) had a high ash ($1.6 \pm 0.00\%$), protein ($14.03 \pm 0.01\%$), amylose ($16.54 \pm 0.34\%$), total sugars ($2.75 \pm 0.01\%$), sodium ($37.50 \pm 0.01\%$) and bulk density ($0.91 \pm 0.01\%$) when compared with *Zango* and *Ex-bornu* cultivars. *Supper-sosat* flour was significantly ($p < 0.05$) high in vitamin B₁ ($0.46 \pm 0.00\%$) and vitamin B₃ ($3.29 \pm 0.01\%$) but significantly ($p < 0.05$) lower in energy value ($373.32 \pm 0.56\%$), Tannins ($0.60 \pm 0.00\%$), soluble dietary fibre (7.47 ± 0.05) and insoluble dietary fibre (2.36 ± 0.08).

CONCLUSION AND RECOMMENDATION: This study has shown that the new cultivar could be a potential source of protein where plant is the main source of protein. The low tannin content is an indicator of nutrients bioavailability and high B-group vitamin for energy metabolism. Low energy value and high fibre respectively makes it a good vehicle for satiety in adult with overweight. The new cultivar (*Super-sosat*) flour with high protein content may be of advantage where animal protein is scarce.

Nutritional Quality evaluation of ketchup produced from blends of Tomato (*Solanum lycopersicum*) and hog-plum (*sponidas mombin*)

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KEYWORDS: Tomato, hog-plum, proximate composition, ketchup

BACKGROUND AND OBJECTIVE:

Tomato ketchup is a condiment made from ripe tomato, sugar, vinegar, salt and other spicy ingredient; it is often used as a condiment to various dishes.

Hog plums are generally rich in dietary fiber, vitamins C, minerals and phytochemicals. Hence, its consumption can protect the body from oxidative stress, reducing the risk of cardiovascular diseases and some types of cancer, as demonstrated by Cavalcante et al. (2007); Kaur et al. (2006); Freitas et al. (2006). It is a fat-free, sodium-free, cholesterol-free and good source of vitamin K that helps in proper bone health (Adedokun et al., 2010). Food processing conditions may affect the nutritional value and other health promoting benefits of products. For instance, processing might degrade some of the phytonutrients or can also make it more bioavailable. In Nigeria, the consumption of tomato ketchup is very low due to high availability of fresh tomato in the market. Many people in the rural areas as a result of illiteracy find it difficult to take ketchup due to its tangy taste and high cost. As a result of its low market in Nigeria, the local manufacturers are not encouraged to produce it. Processing of the excess tomatoes during the tomato season would have helped to prevent losses. Also, there is a need to produce a type of tomato ketchup which is acceptable to our people, with the use of hog-plum. The present study focused on the development of nutritionally enriched ketchup (Nutri-ketchup) from hog-plum and tomato and evaluation of the effect of blending and processing on proximate composition and sensorial quality

MATERIALS AND METHOD: The raw materials, tomatoes and hog plum were purchased at Mile 12 market. Hog-plum and tomato pulps were blended in various ratios: 100:0, 10:90, 20:80, 30:70 and 0:100 respectively, to prepare five formulations of ketchups. Ketchup were prepared according to standard of fruit product order (FPO) specifications which is 68.5% of TSS, 45% of fruit pulp, and 0.5–0.6% of acid (citric acid) per 100g of the prepared product. Both the pulps were blended in required ratios of 45% fruit pulp and 55% sugar. The blends were then heated on a hot plate, with continuous stirring, until the mixture reached the desired temperature of 80 °C. Subsequently, a muslin cloth bag with species mix was added and stirred with the blend. Heating was continued until the mixture was concentrated to the TSS content of 30 °Brix. Then, pectin, salt and acetic acid were added to the mixture, and heated until a TSS of 35 °Brix was obtained. While still hot, ketchup samples were poured into a glass jar, sealed with screw caps, and stored at ambient temperature, before the determination of proximate composition and sensory analysis. The ketchups were labeled as follows: Tomato: Hog plum: HPK (0 :100), TPK (100:0), THK (90:10), HTK (80:20), TKP (70: 30). Three replicates of each sample were used for statistical analysis and reported as the mean ± standard deviation. One-way ANOVA followed by Tukey–kramer multiple comparisons post hoc test ($p \geq 0.05$) was performed using GraphPad Instat 3 software

RESULTS AND DISCUSSION: The proximate composition and acceptability of tomato and hog-plum ketchup is shown in Tables 1 and 2 respectively. The proximate composition of hog-plum and tomato were found out to be in the range of the earlier published reports (Cavalcante et al. (2007); Kaur et al. (2006); Freitas et al. (2006). There were no significant ($p \leq 0.05$) differences among samples for homogeneity, aroma and taste while there were negligible differences among samples for colour and overall acceptability.

Table 1: Proximate composition of composite ketchup from tomatoes and hog plum

Samples	%Ash	%Fibre	%Protein	%Fat	%CHO	%M.C.
HPK	9.16 ^e ±0.01	1.84 ^e ±0.02	6.17 ^e ±0.02	4.30 ^e ±0.27	28.79 ^e ±0.43	49.75 ^a ±0.00
TPK	6.95 ^b ±0.02	1.34 ^b ±0.02	4.66 ^b ±0.01	6.63 ^d ±0.46	25.81 ^b ±0.44	54.60 ^c ±0.01
THK	7.48 ^d ±0.01	1.49 ^d ±0.02	5.00 ^d ±0.01	2.83 ^a ±0.03	26.66 ^c ±0.04	56.53 ^d ±0.01
HTK	6.76 ^a ±0.02	1.31 ^a ±0.02	4.44 ^a ±0.02	3.48 ^b ±0.14	24.79 ^a ±0.12	59.20 ^e ±54.41
TKP	7.29 ^c ±0.00	1.42 ^c ±0.01	4.89 ^c ±0.01	4.33 ^c ±0.20	27.65 ^d ±0.17	54.40 ^b ±0.02

Mean score values of triplicate samples ± standard deviation. Mean values with different superscripts within the same column are significantly different at 5% level of significance.

Table 2: Sensory Evaluation of Ketchup produced from Tomato and Hog-plum

Samples	Colour	Aroma	Texture	Taste	Acceptability
HPK	4.10 ^b ±2.14	4.00 ^a ±1.53	4.23 ^b ±2.19	4.97 ^b ±2.20	5.80 ^a ±1.76
TPK	3.03 ^a ±1.25	3.60 ^a ±1.67	3.37 ^{ab} ±1.67	4.03 ^{ab} ±2.34	5.60 ^{ab} ±1.88
THK	2.47 ^a ±1.20	3.33 ^a ±1.56	3.27 ^a ±1.34	3.50 ^a ±1.53	4.43 ^c ±1.74
HTK	2.67 ^a ±1.35	3.23 ^a ±1.55	3.40 ^{ab} ±1.48	3.43 ^a ±1.85	4.47 ^c ±1.43
TKP	2.50 ^a ±1.66	3.60 ^a ±1.94	3.20 ^a ±1.88	3.47 ^a ±2.13	3.20 ^c ±1.99

Values are mean score values of triplicate samples ± standard deviation. Mean score values with different superscripts within the same column are significantly different at 5% level of significance.

CONCLUSION AND RECOMMENDATIONS:

This study revealed that ketchup made from hog-plum is a rich source of vitamin C, protein, and energy with good taste in terms of sensory attribute. It was also observed the acceptability of the blend ratios decreased with increase in hog plum, however sample THK (90% tomato: 10% hog plum) was most acceptable. Further work is required to demonstrate the changes occurring in individual phytonutrients.

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OC23

Dietary Practices And Nutrient Intakes Of Adolescents Living With Hiv/aids At Federal Medical Centre Makurdi

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KEYWORDS: Dietary Practices; Adolescents; HIV/AIDS

BACKGROUND AND OBJECTIVES:

Adequate intake of both macro and micronutrient is essential for optimum growth, immunity and health [1,2]. However, data on the dietary practices and nutrient intakes of adolescent living with HIV/AIDS (ALWHA) are lacking especially in Nigeria. The objective was to determine the dietary practices and nutrient intakes of ALWHA at Federal Medical Centre (FMC) Makurdi.

MATERIALS AND METHODS

This cross-sectional study was conducted on 326 adolescents who granted informed consent. Data collection methods were 24-hour dietary recall and 3-day weighed food intake on 10% of the subsample. Frequencies, percentages, mean and standard deviation (SD) were employed in data analyses and presentation.

RESULTS: The study revealed high intakes of root/tubers, cereals and high energy snacks but low intakes of fruits, vegetables and animal protein. The mean daily intakes among the male subsample exceeded 100% of recommended nutrient intake (RNI) for energy, thiamin (B₁), riboflavin (B₂) and pyridoxine (B₆). However, protein, iron (Fe), zinc (Zn), calcium (Ca), vitamin A, vitamin C, niacin (B₃) and cobalamin (B₁₂) were suboptimal in majority of the respondents. The study revealed high consumption of root/tubers, cereals and legumes by the subjects which was in line with previous studies [2]. The study

revealed that the mean energy intake by all the subjects met over 100% of their RNI. However, protein, iron (Fe), zinc (Zn), calcium (Ca), vitamin A, vitamin C, niacin (B₃) and cobalamin (B₁₂) were suboptimal in the majority of the subjects as also recorded by another study [2]. The study revealed inadequate intake of micro-nutrients in spite of the roles those nutrients in the development of immunity, which may be attributed to poor dietary practices. Therefore, adolescents living with HIV/AIDS should be targeted in nutrition education intervention in order to optimize their health through good dietary practices and adequate intake of micronutrients.

Table 1: Energy and nutrient intake of male ALWHA expressed as percentage of FAO/WHO requirement (2004)

Age (yrs) N	Nutrients	Energy (Kcal)	Protein (g)	Ca (mg)	Fe (mg)	Zn (mg)	Vit. A (µg/RAE)	Vit.C (mg)	Vit. B ₁ (mg)	Vit.B ₂ (mg)	Vit.B ₃ (mg)	Vit.B ₆ (mg)	Vit.B ₁₂ (µg)
10-13 (9)	Mean intake	2,780.15	34.40	831.10	8.20	7.80	524.15	33.65	1.50	1.40	13.40	1.6	1.90
	±SD	50.13	10.02	1.12	0.30	3.10	12.01	0.61	0.04	0.05	0.60	0.07	0.34
	Requirement for age/sex	2395.00	40.00	1000.0	9.00	8.00	600.00	40.00	1.20	1.30	16.00	1.30	2.40
	Intake as % requirement	116.08	86.00	83.11	91.11	97.50	87.35	84.16	125.00	107.69	83.75	126.90	79.17
14-19 (8)	Mean intake	3210.50	42.30	725.56	8.95	8.42	455.40	30.14	1.34	1.35	13.20	1.50	1.65
	±SD	60.67	12.01	1.12	2.01	2.11	20.89	10.12	0.50	0.06	0.90	0.05	1.00
	Requirement for age/sex	2,985.0	52.00	1300.0	11.00	11.00	600.00	45.00	1.20	1.30	16.00	1.30	2.40
	Intake as % requirement	107.55	81.35	66.20	81.36	76.55	75.92	66.98	111.67	103.85	82.50	115.40	68.75

Foot note: N= Number of subjects; Adol.= adolescence; RAE= Retinol Activity Equivalent; µg = microgram; mg= milligram.

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Healthy Eating Practices in Free-living Elderly Individuals: Implications for Healthy Life-Years

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KEYWORDS: Elderly, Healthy Eating Index, Malnutrition, Practice

BACKGROUND AND OBJECTIVE:

Healthy eating is a widely advocated strategy for promoting health and longevity in the elderly population^[1]. However, studies assessing dietary practices of elderly individuals that could inform appropriate interventions are limited in Nigeria. This study assessed the healthy eating practices among free-living elderly individuals in Ibadan Metropolis.

MATERIALS AND METHODS:

The study was descriptive cross-sectional. A multi-stage sampling procedure was used to select 358 elderly individuals in two Local Government Areas in Ibadan Metropolis. An interviewer-administered semi-structured questionnaire covering demographic characteristics, socio-economic status (SES), healthy eating knowledge and practices, and physical activity behavior was used for data collection. Nutritional status was determined following the Body Mass Index (BMI) criteria. Healthy Eating Index (HEI) score was based on 11-point scale with a median cut-point of 5. Associations were tested using chi-square and logistic regression with p-value <0.05 being considered significant.

RESULTS AND DISCUSSION:

Many (67.6%) respondents were females. The HEI score of 58.7% respondents was categorized as high (table 1) which was significantly associated with younger age, female gender, high SES, not obese, good healthy eating knowledge and ≥ 30 minutes daily walk (table 2). However, significant association only exists with two variables at the multivariate level. Individuals who were not obese and who had ≥ 30 minutes daily walk were 2.56 and 0.4 times likely to have high HEI score. This finding supports that excess body weight and declining physical ability could compromise physical access to healthy foods^[1].

CONCLUSION AND RECOMMENDATIONS

A significant proportion of the respondents have low HEI score. Future interventions aimed at improving dietary practices in the elderly population might benefit more by targeting vulnerable groups including older men of low SES, obese individuals and those that are less active.

Table 1: Healthy dietary practices among elderly respondents

Practice	N	%
Skip breakfast (<3days/week)	320	89.4
Eat varieties of food at each meal (≥3days/week)	188	52.5
Fruit intake (≥3days/week)	194	54.2
Eat fruit as snacks (≥3days/week)	207	57.8
Vegetable intake (≥3days/week)	106	29.6
Take large quantity of vegetable with main food (≥3days/week)	110	30.7
Take fish and poultry (≥3days/week)	275	76.8
Take milk and milk products (≥3days/week)	277	77.4
Eat legumes and nuts (≥3days/week)	117	32.7
Take at least 8 glasses of water daily (≥3days/week)	175	48.9
Eat fried foods (<3 days/week)	324	90.4
Healthy Eating Index		
High	210	58.7
Low	148	41.3
Total	358	100

Table 2: Determinants of High Healthy Eating Index

Variable	Category	N	%	χ^2	p-value
Age (years)	60-74	152	72.4	6.56	0.01
	≥75	58	27.6		
Gender	Male	77	36.7	4.218	0.04
	Female	133	63.3		
Marital Status	Married	99	47.1	4.028	0.045
	Others	111	52.9		
Socio-Economic Status	Low	100	47.6	6.066	0.014
	High	110	52.4		
Nutritional Status	Obese	25	11.9	4.382	0.026
	Not Obese	185	88.1		
Knowledge of Healthy Eating Guideline	Poor	160	76.2	12.296	0.000
	Good	50	23.8		
Daily walk	<30min	47	22.4	18.734	0.000
	≥30min	163	77.6		

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PC25

Effect of *Spondias mombin* leaf powder on Cyclophosphamide-induced anaemia in male Albino rat (*Rattus norvegicus*)v

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KEYWORDS: Anaemia, Rat *Spondias mombin*, prevalence.

BACKGROUND AND OBJECTIVE:

The current prevalence of anaemia is increasing with sub-Saharan Africa having about 60% and Nigeria, 22.1%, and this imposes both health and economic challenges to the region. This study investigated the effect of *Spondias mombin* leaf powder on cyclophosphamide –induced anaemia in adult male Albino Wistar rats.

MATERIALS AND METHODS

Spondias mombin leaves were collected from the Department of Botany and Biotechnology garden, University of Nigeria, Nsukka. Albino rats were sourced from the Faculty of Veterinary medicine, University of Nigeria, Nsukka. All humane animal protocol were strictly observed and adhered to. Anaemia was induced in rats by administration of cyclophosphamide through oral route with the aid of an intubation tube. Anaemia was confirmed in rats with haemoglobin levels of $\leq 8\text{g/dL}$. Fifty anaemic adult albino Wistar rats were randomly assigned into five groups of ten rats each ($n=10$). The first group (normal) received distilled water while others were administered daily with 0.5, 1, 1.5 and 2g/kgbw of *Spondias mombin* leaf powder for 28days. All the animals were given animal feed and water *ad libitum*. The effect of the leaf powder on haematological parameters were estimated. All analyses were conducted according to AOAC procedures. Statistical analyses were carried out and results were accepted at $p \leq 0.05$

RESULTS AND DISCUSSION

Haemoglobin and RBCs significantly ($p < 0.05$) increased in the group fed 2g/kgbw. Platelets and erythrocytes sedimentation rate exhibited dose-dependent significant ($p < 0.05$) increases. Mean cell volume (MCV) increased but the increases did not differ significantly ($p > 0.05$) among the test groups. Mean

cell haemoglobin (MCH) and mean cell haemoglobin concentrations (MCHCs) reduced in the group fed 2g/kgbw. The WBC values and the lymphocytes increased significantly ($p < 0.05$). Neutrophils and eosinophils exhibited significant ($p < 0.05$) reductions in the group fed 2g/kgbw. Total and direct bilirubin decreased significantly in groups fed 1.5 and 2g/kgbw, respectively. Indirect bilirubin increased significantly ($P < 0.05$) in groups fed 1.5 and 2g/kgbw. The high potential of *Spondias mombin* to deal with anaemia conditions in rats could be due to its phytochemical constituents that have inherent haemopoietic factors responsible for production of blood in the bone marrow of experimental rats.

CONCLUSION AND RECOMMENDATION

The findings revealed that administration of *Spondias mombin* leaf powder improved cyclophosphamide-induced anaemic conditions in rats while human trials on the leaf should be investigated.

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Knowledge, Attitude, And Practice Of Nutrition Labels In Calabar Metropolis

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KEYWORDS: Knowledge, Attitude, Practice, Nutrition label,

BACKGROUND AND OBJECTIVE:

Nutrition labels provide the information that helps consumers make informed choices [1]. Proper use of nutrition labels can help better nutrition status and ensure nutrition security [2]. In making policies concerning nutrition labeling, it is important to know the KAP of the populace towards the use of nutrition labels. There is porosity of data on the Knowledge, Attitude, and Practice (KAP) of nutrition labels in Calabar metropolis. The aim of this study is to assess the KAP of the use of nutrition labels in Calabar Metropolis.

MATERIALS AND METHOD: A cross-sectional study of 400 respondents resident in Calabar Metropolis was used to get information on the KAP of a nutrition label. A structured questionnaire which was divided into four (5) sections were used, section A, B, C, D, and E included questions on the socio-demographic characteristic, knowledge, attitude, practice, and factors that influence the use of nutrition labels respectively.

RESULTS AND DISCUSSION:

The results showed that 59.5% of the respondents had knowledge of what nutrition label is but only 21.8% often make use of nutrition label before making decisions on the food to purchase. Nutrition labels on drinks were the most frequently read (30.3%). About 22.3% of the respondents considered the expiry date prior to purchase, while 15.3% considered price, and 11% considered the ingredients used as an important aspect when purchasing food. This study showed that the respondents in Calabar metropolis have mixed views on nutrition labeling. Some 66% of the respondents find it useful for making better choices, while 34% believed it is not useful because they do not understand nutrition labels and that it is time-consuming.

CONCLUSION AND RECOMMENDATION: From this study, it is imperative that the health workers should include nutrition education tailored towards the use of food labels during antenatal lectures and extension works in rural areas.

Table 1: FACTORS THAT INFLUENCE THE USE OF NUTRITION LABEL

Statement	Response	Frequency	Percentage %
Is the food label helpful during your food purchasing decision?	Yes	262	65.5
	No	138	34.5
If yes why?	I understand the information on the food label	89	22.3
	experience food allergy	38	9.5
	To control energy intake	55	13.8
	For health and beauty	48	12.0
	Concern about taste and price	37	9.3
If no why?	I do not know how to use food labels.	46	11.5
	Time constrain/ limited time	35	8.8
	label is not attractive and is confusing	9	2.3
	There is no label on certain food	11	2.8
	No health problem	29	7.3

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Abdominal Obesity as a Risk Factor of Metabolic Syndrome and its Association with Selected Socioeconomic and Demographic Characteristics among School Teachers in Ogun State, Nigeria.

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KEYWORDS: Abdominal Obesity, Metabolic Syndrome, Socioeconomic and Demographic.

BACKGROUND AND OBJECTIVE:

Metabolic syndrome (MS) is considered a threat to public health due to its growing prevalence worldwide. School Teachers comprise the largest percentage of government employees in most parts of Nigeria. Poor nutrient intake, socioeconomic, demographic characteristics and insufficient physical activity might increase the risks of metabolic syndrome. It is, therefore, important that individuals be identified and treated early. Thus, this study assesses some selected risk factors of metabolic syndrome among school teachers.

MATERIALS AND METHOD:

This study is a cross-sectional study conducted among government primary and secondary school teachers in Odeda Local Government Area of Ogun State, Nigeria. A multistage sampling technique was used to select 320 respondents. A pretested semi-structured questionnaire was used to obtain the respondent's socioeconomic and demographic characteristics. An inelastic fiberglass tape rule was used to obtain the respondent's waist circumference following the Food and Nutrition Technical Assistant (FANTA) procedure. The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria was used to determine the presence of abdominal obesity. The data were coded and analyzed using Microsoft Excel 2019 and Statistical Package for Social Sciences (SPSS) version 20. Frequency count and percentage were used to present the result. Chi-square was used to determine the association among variables.

RESULTS AND DISCUSSION:

The prevalence of abdominal obesity among the respondents was 51.6%. It was observed that there was an association between gender, age, marital status, years of working experience, monthly income and waist circumference of the respondents having a p-value < 0.05 (Table 1). This result is similar to the findings made by (1), who reported an association between gender, monthly income, education level, and waist circumference.

Table 1: Association between Waist Circumference of the Respondents and Socioeconomic and Demographic Characteristics.

Variables	Waist Circumference						χ^2	P-value
	No abdominal obesity		Presence of abdominal obesity		Total			
	F	%	F	%	F	%		
Gender								
Male	64	20.0	3	0.9	67	20.9	75.223	0.000
Female	91	28.4	162	50.6	253	79.1		
Age								
20-30	15	4.7	2	0.6	17	5.3	22.535	0.000
31-40	41	12.8	24	7.5	65	20.3		
41-50	85	26.6	110	34.4	195	60.9		
51-60	14	4.4	29	9.1	43	13.4		
Marital status								
Single	27	8.4	3	0.9	30	9.4	26.750	0.000
Cohabiting	3	0.9	1	0.3	4	1.2		
Married	119	37.2	146	45.6	265	82.8		
Separate	1	0.3	4	1.2	5	1.6		
Divorced	2	0.6	5	1.6	7	2.2		
Widowed	3	0.9	6	1.9	9	2.8		
Years of working experience								
0-5	18	5.6	4	1.2	22	6.9	23.603	0.001
6-10	15	4.7	7	2.2	22	6.9		
11-15	58	18.1	71	22.2	129	40.3		
16-20	45	14.1	41	12.8	86	26.9		
21-25	12	3.8	29	9.1	41	12.8		
26-30	7	2.2	10	3.1	17	5.3		
31-40	0	0	3	0.9	3	0.9		
Monthly income(N)								
<15000	0	0	1	0.3	1	0.3	30.262	0.000
15000-29,999	1	0.3	0	0	1	0.3		
30000-44,999	11	3.4	1	0.3	12	3.8		
45000-59,999	17	5.3	2	0.6	19	5.9		
60000-74,999	31	9.7	28	8.8	59	18.4		
75000-89,999	41	12.8	49	15.3	90	28.1		
90000-104,999	36	11.2	51	15.9	87	27.2		
>105,000	18	5.6	33	10.3	51	15.9		

CONCLUSION:

Most female teachers have abdominal/central obesity and are more at risk of metabolic syndrome

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Dietary habit and nutritional status of the older adults in Obio-Akpor Local Government Area of Rivers State

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KEYWORDS: Dietary habits, optimal nutritional status and elderly

BACKGROUND:

Adequate dietary habits and optimal nutritional status of the elderly will support the delay of aging associated degenerative diseases.

Objectives: The objective of this study is to investigate the dietary habit and nutritional status of the older adults in Obio-Akpor Local Government Area, Rivers State.

METHODOLOGY: A multi-staged sampling technique was used to select 372 subjects. Structured questionnaire was administered to elicit responses. Anthropometry was conducted using standard instruments and techniques, values obtained were compared with WHO recommendations. Descriptive and correlation analysis were computed for the variables using SPSS Version 25.

RESULTS: Results revealed that 72.6% of respondents were females, aged 60-69 years 53.0%, tertiary education 46.8% and while business 56.7%. 17.2% had hypertension, 15.6% diabetes 10.5%, ulcer 8.1%. 11.0% of respondents do not participate in physical activity, while 78.8% of respondents are involved in walking and brisk walk. 71.8% of respondents are non-smokers while only 22.3% of respondents consume alcohol. 68.0% of respondents had good appetite while 17.8% had poor. 29.8% of the respondent's skip meals, particularly lunch. 49.2% and 32.5% of respondents consumed 1 litre and 1.5 litres of water respectively. 50.5% of the respondents had normal BMI, while 23.4% and 11.3% were overweight and obese respectively. Majority (68.5-73.4%) of the respondents were at risk of obesity and metabolic diseases. Respondents' age correlated with their appetite ($p = 0.03$) and water fluid intake quantity ($p = 0.02$).

CONCLUSION:

Improved dietary and lifestyle practices particularly in the area of fruit/vegetables consumption and physical activity through increased awareness/sensitization exercise were encouraged.

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OC30

Prevalence and Chemical Mobility of Toxic Heavy Metals in Soil and Cultivated Farm Produce from Farmlands in three Localities of Namibia

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KEYWORDS: Heavy metals; Prevalence; Farmland; Namibia

BACKGROUND AND OBJECTIVE:

Food is essential to life, however, the safety of foods for consumption is equally important, otherwise the concept of its essentiality may be questioned. Food safety may be compromised by pollutants emanating from anthropogenic activities such as petrochemical, mining, and power plants with impact on environmental and human health [1]. These activities are known to release gaseous and heavy metal (HM) contaminants into the environment, which can undergo atmospheric dispersal and deposition far beyond their original sources. Namibia rely on mineral exploitation as one of the mainstay of the economy and pollution from HMs such as Cu, Zn, Pb, Ni, As, and Cr are inevitable. Contamination of soil by HMs may lead to uptake and bioaccumulation by edible plants with serious health implications. Incidences of toxic HMs in agricultural foods have been reported, but none has endeavoured to investigate chemical mobility from substrate to cultivated farm produce in Namibia. Hence, the study objective was to evaluate the prevalence and chemical mobility of toxic HMs in soil and cultivated produce from commercial farms at three selected localities of Namibia.

MATERIALS AND METHODS:

Soil and farm produce such as Spinach, Cabbage, Pearl Millet (*Mahangu*) Maize, and Cassava from farmlands were sampled over a period of about two years. Samples were pre-treated, and HM content extracted using mineral acid-microwave assisted digestion [2] while those in soil samples was by a 3-step modified BCR sequential extraction [3]. Instrumental analysis was by Inductively Coupled Plasma-Optical Emission Spectroscopy (ICP-OES).

RESULTS AND DISCUSSION

Results obtained revealed the overall mean concentrations (OMC) of Cr, Mn, Hg, Ni, Cu, Zn and Pb in soil across sampling periods ranged from 0.4-1.5mg/kg; 598.3-1740.8mg/kg; 7.7-8.0mg/kg; 0.33mg-0.89mg/kg; 1.6-1.8mg/kg; 2.1-7.5mg/kg and 8.5-35.1mg/kg respectively. The OMC in food samples in the same metallic order were 0.4-5.6mg/kg; 28.1-121.9mg/kg; 0.5-11.8mg/kg; 0.6-3.3mg/kg; 3.8-7.2mg/kg; 8.7-42.7mg/kg and 2.0-11.6mg/kg. The results showed general prevalence of analysed metals in both soil and food samples. Bioaccumulation factor (BAF) > 1 in some metals indicate chemical mobility of labile metal fractions from soil to food samples. Continual consumption of produce at this metallic level may lead to bioconcentration and bioaccumulation with long-term health effects.

Table 1: Overall Mean Conc. (mg/kg) of Heavy Metals in Analysed Food Samples across Sampling Periods (SP) (2017-18)

SP	Cr	Mn	Hg	Ni	Cu	Zn	Pb	Cr
SP1	2.7±2.5	76.3±37	0.6±0.3	0.8±0.7	4.1±4.0	8.7±7.9	2.2±2.0	2.7±2.5
SP2	3.0±2.8	122±198	0.9±0.9	1.2±1.3	6.4±5.2	42.7±63	6.4±7.8	3.0±2.8
SP3	4.6±2.5	84.0±129	0.5±0.3	0.6±0.7	3.8±3.9	9.0±7.9	4.6±2.5	2.0± 1.8
SP4	0.4±0.5	47.4±35	0.7±0.5	0.6±0.5	7.2±7.1	26.9±19	2.0±2.5	0.4±0.5
SP5	5.6±1.6	37.3±15	1.0±0.5	3.3±0.6	7.1±0.9	38.7±5.7	5.7±5.3	5.6±1.6
SP6	5.1±2.5	28.1±16	11.8±0.7	1.5±0.2	4.3±0.3	13.4±3.6	11.6±0.4	5.1±2.5

SP = Sampling Period; SP1-SP6 = Sampling Period 1-6

Table 2: Overall Mean Conc. (mg/kg) of Heavy Metals in Analysed Soil Samples across Sampling Periods (SP) (2017-18)

SP	Cr	Mn	Hg	Ni	Cu	Zn	Pb	Cr
SP1	0.44±0.2	1304.6±148	8.0±0.02	0.61±0.4	1.8±0.16	7.5±4.1	8.7±0.5	8.7±0.5
SP2	1.3±0.9	1740.8±354	8.0±0.01	0.48±0.4	1.8±0.5	5.6±3.1	8.8±0.7	1.28±0.7
SP3	1.5±0.7	598.3±45	7.8±0.2	0.33±0.2	1.6±0.1	2.1±0.4	9.2±0.6	1.5±0.7
SP4	0.4±0.2	1305±148	8.0±0.1	0.61±0.4	1.9±0.2	7.5±4.1	8.7±0.45	0.4±0.5
SP5	0.5±0.2	1298.2±144	7.7±0.4	0.6±0.41	1.8±0.2	7.3±4.0	8.5±0.56	0.4±0.2
SP6	0.4±0.3	862.6±475	7.9±0.2	0.89±0.3	1.7±0.16	7.5±4.1	35.1±35	0.4±0.3

SP = Sampling Period; SP1-SP6 = Sampling Period 1-6

CONCLUSION AND RECOMMENDATION

The presence of analysed metals above permissible levels are of serious threat to human health with possible long-term health implications. This is particularly dire for children and the elderly with high need of vital micro-nutrients from vegetables and fruits. Comprehensive soil treatment and remediation is recommended for food safety and security.

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PC31

Effect of different smoking kilns on the organoleptic assessment of the smoked fish species.

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KEYWORDS: Fish, smoking, smoking kiln, organoleptic.

BACKGROUND AND OBJECTIVE:

Smoking is the removal of most of the water from the flesh and the depositing of preservation chemical on the fish flesh. Smoking of fish and/or meat products is one of the most ancient processing technologies. Consumers are rediscovering the good taste of smoked seafood, including catfish. To satisfy the consumer demand, it is necessary to produce good quality and safe smoked sea food products¹. *Chrysichthys nigrodigitatus*, Silver catfish was used in this study. The objective of this work the effect of different smoking kilns on the organoleptic assessment of the smoked fish specie of *Chrysichthys nigrodigitatus*

MATERIALS AND METHODS:

C. nigrodigitatus were collected from the artisanal fishermen from Makoko Jetty area of Lagos Lagoon. The fish samples were eviscerated, scaled, washed thoroughly with clean water and immediately preserved using iced packed cooler and transferred to the Department of Marine Sciences, University of Lagos and kept in the Freezer at -4°C for further investigations. The three smoking kilns were loaded with firewood. After fish was thoroughly washed fish species was divided into three and smoked in three different smoking kiln creating nine different sample treatments for the research work.

In this research work three types of smoking kiln were used and they are as follows:

- 44 gallon-drums smoking kiln with a single smoking rack
- The NIOMR improved smoking kiln
- The commercial smoking kiln

SENSORY (ORGANOLEPTIC) EVALUATION was carried out by a panel according to the method of Eyo².

The questionnaires were prepared having hedonic scale of 2 - 10 [data were transformed into scale as follows: Like definitely = 10; Like mildly = 8; Neither Like/Dislike = 6; Dislike mildly = 4 and Dislike definitely = 2].

RESULTS AND DISCUSSION

SELECTION OF INGREDIENTS: *Chrysichthys nigrodigitatus* (silver catfish) was selected for its excellent taste and flavours, it is also an economically important indigenous fish.

SENSORY (ORGANOLEPTIC) EVALUATION: Table1 below the mean value of Sensory (organoleptic) evaluation reveals that the type of smoking kiln used did not affect the acceptance of the smoked fish although there were significant differences among some attributes.

Table1: The mean value of Sensory (organoleptic) evaluation

Attributes	Colour	Odour	Taste	Mouth feel
Smoking kiln				
44 Gallon	7.78±1.52	8.00±1.19*	7.56±1.29	7.00±1.57
NIOMR	7.89±1.75*	7.67±1.85	8.22±2.16	7.44±2.04*
Commercial	7.89±1.45	7.78±2.05*	7.56±1.10*	6.89±1.71*

*Significance differences

CONCLUSION:

The organoleptic assessment of the all smoked fish samples showed high level of acceptability of processed products with every sensory attribute highly ranked.

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Effect of Nutrition Education On Anthropometric Variables Of Type 2 Diabetes Mellitus Patients Attending NNPC Clinic Warri, Delta State Nigeria.

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KEYWORDS: Type 2 Diabetes Mellitus, Nutrition Education, BMI, waist circumference.

BACKGROUND AND OBJECTIVE:

Diabetes mellitus causes prolonged ill-health, imposes morbidity and mortality risks, and necessitates a change in lifestyle, with a meticulous daily routine and long-term self-care(1). About 85% of Type 2 diabetics are obese (2). Obesity and physical inactivity comprise an important worldwide epidemic that has been linked to the increased prevalence of diabetes and the metabolic syndrome (3). Waist Circumference (WC) is an indicator of health risk associated with excess fat around the waist. The objective of the study was to assess the effect of nutrition education on anthropometric variables of the type 2 diabetes mellitus patients. The result of the research would provide evidence based data that would be beneficial to people living with diabetes mellitus (PLWDM), healthcare professionals, care givers, policy makers, Institutions, society and Individuals

MATERIALS AND METHOD:

Two Hundred and Thirty (230) selected subjects who participated in the longitudinal study were confirmed Type 2 diabetics. The subjects were grouped into education group and control group. Baseline information on socio-demographic, life-style characteristics, and management regimens of the diabetics were collected using structured, validated and pretested questionnaire. The initial weights, height, BMI, waist circumference measurement were collected. The nutrition education instituted consists of two sessions for 1 to 2 hours performed in a group of 12-15 patients per session. Post Nutrition education and three (3) months follow up information on anthropometric and management regimens data of the subjects were collected.

RESULTS AND DISCUSSION

Result showed that about 54% of the subjects in the education group were middle age (40-59 years) and 36% of the control group. For the control group only 6.25% were between 20-30 years and 45.00% of the subjects were 60-79 years while 12.25% were 80 years and above. Most (56.67%) of the subjects were male for the education group and 52.50% were male for the control group. For the education group only 1.3% was single, 87.3% were married, 8.7% and 2.76% were widowed and separated respectively while the control group most (80.75%) were married, 8.75% and 2.50% were widowed and separated respectively. Result showed that the mean weight of the education group at baseline and after 3 months follow up was

81.41kg and 78.02kg; the BMI were 30.03kg/m² and 29.2 kg/m², respectively. Also the mean weight of the control group at baseline and after 3 months was 80.30+9.14kg and 81.78+7.90kg and BMI were 29.63+5.31 kg/m² and 30.87+5.1831 kg/m², respectively.

The mean waist circumferences of the education group at baseline and after 3 months follow up were 101.03+2.01cm and 99.43+5.41cm, for the male, respectively, while 109.33+9.50cm and 105.03+4.40 were for the female, respectively. Also the mean waist circumferences of the control group at baseline and after 3 months were 101.90+4.40cm and 101.90+4.40cm for the male, respectively, while 102.02+10.40cm and 103.11+10.10cm were for the female, respectively.

Most of the subjects both in the control and education group were overweight and obese. Only 14.7% and 16.25% of the subjects both in the education and control group had normal BMI (18.5-24.9 kg/m²). After three months follow up, the number of the subjects who had normal BMI almost doubled from 14.7% to 25.3% in the education group. However, there was marginal decrease in the number of the subjects who had normal BMI decreased from 16.25% to 11.25% in the control group after three months.

CONCLUSION

Nutrition education is an essential component in weight management in Type 2 diabetes mellitus patients. The study showed that nutrition education and active follow up is effective in weight management in Type 2 diabetes mellitus and this can be attributed to an improved and changes in dietary habits and food choices of respondents.

RECOMMENDATION

Subjects should be encouraged to comply with their treatment through regular conduct of diabetes education and training programs. The diabetes education program should be directed towards improving patient's knowledge about diabetes, its prevention, treatment and compliance in order to promote sound practice in the management of the disease.

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The effect of processing on antinutrient content of *Vigna unguiculata* (Cowpea) and *Cajanus cajan* (Pigeon pea) and its impact on the haematological profile and growth performance in rats

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KEYWORDS: Antinutrients; Processing; Growth Performance; Haematological Indices

BACKGROUND:

Background and Objectives: Legumes are important sources of protein, fibre and micronutrients in human diet especially in countries with high prevalence of food insecurity [1,2]. The presence of antinutrients affects nutrient bioavailability and digestibility [2]. This study investigated the effect of processing on antinutrient content of cowpea and pigeon pea seeds and evaluated its impact on the haematological profile, growth performance and histopathological characteristics of some vital organs in rats.

MATERIALS AND METHODS: Matured cowpea and pigeon pea seeds were randomly divided into 2 groups each (raw and cooked). The seeds were dried and pulverized. Samples were analysed for proximate composition, minerals and antinutrients using standard procedures. The dried seeds were incorporated into the diets of experimental rats. Albino rats were randomly divided into five groups and fed with the control and experimental diets for 21 days. During this period, food intake and body weights were measured daily and feed conversion ratio (Fcr) was calculated. Blood samples were collected at the end of the experiment for haematological indices. The animals were sacrificed and some vital organs were excised for histopathological analysis. Descriptive statistics and correlation analysis were done using SPSS.

RESULTS AND DISCUSSION: Result showed that lectin, trypsin inhibitor, amylase inhibitor and saponin were significantly higher ($p < 0.05$) in raw seeds than cooked seeds. While the rats fed with cooked seeds gained weight consistently, those on raw diet lost weight and never recovered during the study. The Fcr ranged between -9.23 in raw pigeon pea to 18.83 in cooked cowpea. While 7.64g of control feed was required to gain 1g, cooked pigeon pea and cowpea need 17-18g. On the Weight gain/loss (g) other hand for every 7-9g of raw beans consumed the rat lost 1g. There was a positive correlation between weight gain and food intake in the control ($r = 0.489$; $p = 0.021$), cooked cowpea ($r = 0.566$; $p = 0.006$) and cooked pigeon pea ($r = 0.940$; $p = 0.000$). A negative correlation was observed in unprocessed cowpea ($r = 0.919$; $p = 0.000$) and pigeon pea ($r = -0.806$; $p = 0.000$). Although rats on cooked beans had higher haematological indices the difference was not statistically significant ($p > 0.05$). Histopathological analysis showed that the liver and kidney were adversely affected in rats treated with unprocessed seeds.

Table 1: Anti-nutrient contents of cooked and raw samples of cowpea and pigeon pea

Anti-nutrient	Cooked cowpea	Raw cowpea	Cooked pigeon pea	Raw pigeon pea
Phytic Acid (%)	0.81±0.01a	1.21±0.03b	1.21±0.02b	1.21±0.03b
Oxalate(mg/100g)	9.78±0.09a	19.51±0.084b	18.22±0.04b	19.51±0.084b
Tannins(mg/100g)	65.17±0.13a	75.23±0.047b	73.7±1.07b	75.23±0.047b
Saponin(mg/100g)	188.2±2.84a	201.73±0.21b	196.33±0.05b	201.73±0.21b
Trypsin Inhibitor (TIU/g)	6.26±0.06a	8.28±0.4b	9.10±0.23b	11.93±0.62c
Chymotrypsin (CIU/g)	1.17±0.05a	1.34±0.03a	2.96±0.09b	3.21±0.06b
Amylase Inhibitor (unit/g)	11.27±0.06a	25.53±0.48b	9.77±0.61a	31.10±0.29c
Lectin (unit/g)	0.13±0.02b	0.34±0.02a	0.01±0.01c	0.21±0.03d

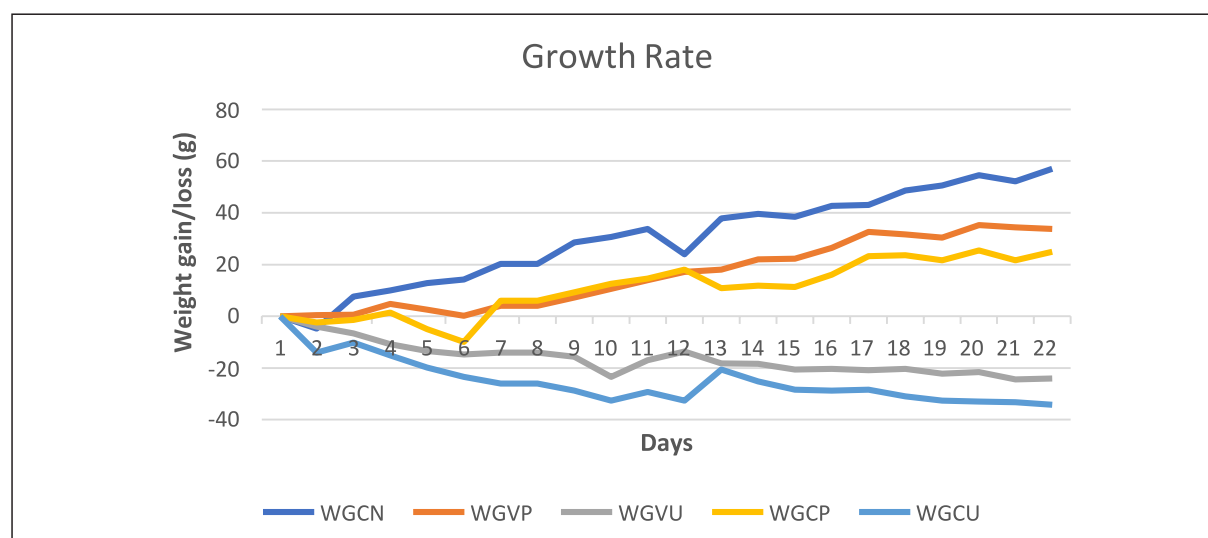


Figure 1: Growth rate of rats

CONCLUSION: This finding showed that the ingestion of unprocessed cowpea and pigeon pea seeds impaired growth and caused damage to the liver and kidney of experimental animals.

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Assessment Of Micronutrient and Antinutrient Composition of Succulent Raw And Cooked Silk Cotton (*Ceiba Pentandra*) Leaves

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KEYWORDS: *Ceiba pentandra*, micronutrient, antinutrient composition

BACKGROUND:

The leaves of *Ceiba pentandra* are indigenous vegetable that are consumed in some parts of Nigeria and other West African countries. It is severally known among some Nigerian ethnic groups as Rimi (Hausa), Bamtami (Fulani), Arabaogungun (Yoruba) and Apu (Igbo)¹. It has therapeutic properties for the management and prevention of chronic non-communicable diseases. This research assessed the micronutrient and antinutrient composition of succulent raw and cooked silk cotton (*Ceiba pentandra*) leaves.

MATERIALS AND METHODS

Young shoots and fresh leaves of *Ceiba pentandra* were harvested from Umuezegwu in Ihitte/ Uboma Local Government of Imo State, Nigeria. The homogenous mixture of the sample was divided into four portion for different processing methods: fresh leaf (sample A), blanched leaf (sample B), soup prepared with the leaf (sample C) and sauce prepared with the leaf (sample D). Each sample was analyzed for proximate, mineral, vitamin and antinutrient composition using standard methods of AOAC².

RESULT AND DISCUSSIONS

The mineral composition showed statistical significant difference ($p < 0.05$), with increase in the mineral content after processing using the various cooking methods. Fresh *Ceiba pentandra* leaves provide about twice the daily value of iron, this shows that it is a very good source of iron. The high β -carotene and ascorbic acid content of the vegetable is an indication that the leaf will be a good source of anti-oxidants and other phytochemicals which could be used in the prevention and management of many malnutrition cases³. The antinutrient values reduced in samples B, C and D when compared to sample A.

CONCLUSION AND RECOMMENDATION

Processing led to significant reduction in the antinutrient and water soluble vitamins. Sauce from the leaf of *Ceiba pentandra* retained more micronutrient compared to other processing methods. Therefore, inclusion of this underutilized vegetable in the diet will help to reduce malnutrition and non-communicable diseases.

Table 1: Micronutrient Composition of *Ceiba pentandra* leaf (mg/100g fresh Weight)

Parameters	A	B	C	D
Sodium	68.93± 0.42 ^a	147.08 ± 0.7 ^b	170.04± 2.23 ^c	196.92±2.13 ^d
Potassium	183.40 ±0.74 ^a	361.78 ± 1.75 ^b	372.58± 1.34 ^c	404.03±2.67 ^d
Calcium	119.38 ±1.04 ^a	218.39 ± 1.41 ^b	238.82± 2.23 ^c	275.00±2.64 ^d
Magnesium	102.48 ± 0.81 ^a	186.21 ± 1.40 ^b	200.64 ±2.67 ^c	232.76±2.67 ^d
Phosphorus	112.99± 0.59 ^a	212.46 ± 1.40 ^b	220.89 ±1.69 ^c	255.77±2.13 ^d
Iron	34.63 ± 0.74 ^a	76.52 ± 1.75 ^b	92.12 ± 2.67 ^c	104.12±3.20 ^d
Zinc	12.95 ± 0.01 ^a	26.14 ± 0.03 ^b	17.58 ± 0.01 ^c	19.58 ± 0.01 ^d
β-Carotene (µg/100g)	330.70±0.17 ^a	297.13 ± 0.29 ^b	312.96±0.58 ^{ad}	339.72± 0.35 ^d
Vitamin B ₁	3.49 ± 0.02 ^a	1.67 ± 0.02 ^b	0.18 ± 0.03 ^c	0.15 ± 0.02 ^c
Vitamin B ₃	5.76 ± 0.02 ^a	1.90 ± 0.02 ^b	1.08 ± 0.02 ^b	1.04 ± 0.02 ^b
Vitamin B ₆	2.27 ± 0.03 ^a	0.87 ± 0.02 ^b	0.50 ± 0.02 ^b	0.45 ± 0.02 ^b
Vitamin C	36.41 ± 0.03 ^a	32.51 ± 0.02 ^b	21.76± 0.02 ^c	18.95 ± 0.03 ^d

Values with the same superscript on the same row are not significantly different ($p > 0.05$)

*Values are means and standard deviations of triplicate determinations

Table 2: Anti-nutrient Composition of *Ceiba pentandra* leaf (mg/100g Fresh Weight)*

Parameter	A	B	C	D
Phytate	2.71±0.54 ^a	1.37±0.00 ^b	0.82±0.02 ^c	0.78±0.02 ^c
Oxalate	1.66±0.08 ^a	0.88±0.02 ^b	0.58±0.03 ^c	0.53±0.21 ^c
Tannin	0.06±0.25 ^a	0.03±0.48 ^a	0.02±0.00 ^c	0.01±0.00 ^c
Saponin	3.97±0.08 ^a	2.28±0.34 ^b	1.71±0.03 ^c	1.66±0.02 ^d
Glycoside	2.69±0.39 ^a	1.18±0.03 ^b	0.32±0.34 ^c	0.29±0.34 ^c
Flavonoid	0.08±0.00 ^a	0.04±0.18 ^b	0.02±0.00 ^c	0.01±0.00 ^d
Alkaloid	3.19±0.60 ^a	1.27±0.01 ^b	1.01±0.03 ^b	0.90±0.02 ^b

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Dietary Diversity Scores and Nutrient Intake Adequacy of In-school Adolescents in Ijebu-Ode Local Government Area of Ogun State, Nigeria

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KEYWORDS: Adolescents, Dietary Diversity Scores, Nutrient intake adequacy

BACKGROUND:

Dietary diversity, a potential proxy indicator of nutrient adequacy, when thoroughly administered, irrespective of background, brings about healthy and agile individuals [1]. This study assessed dietary diversity scores and adequacy of nutrient intake of in-school adolescents in Ijebu-Ode Local government Area (IOLGA) of Ogun State.

MATERIALS AND METHODS:

This study was conducted among in-school adolescents from 15 secondary schools in IOLGA of Ogun State. Descriptive cross-sectional survey design was adopted for the study, Simple random technique was used to select two hundred and twenty-five (225) adolescents from both public and private secondary schools in IOLGA. Dietary Diversity Score (DDS) was assessed using a 9-food group model. Nutrient Intake Adequacy was calculated using Energy Efficiency Ratio (EER) for energy intake, Acceptable Macronutrient Distribution Range (AMDR) for carbohydrate, protein and fat. For vitamins and minerals, Estimated Average Requirement (EAR) and Tolerable Upper Intake Level (ULs) were used. Statistical Package for Social Sciences (SPSS) software, using frequency and percentage was used for analysis of the data collected. Hypothesis was tested using student t-test at $p < 0.05$ level of significance.

RESULTS

Majority of participants were between the ages 14-16 years, and mean age was 13.68 ± 1.77 years. Female respondents (58.6%) were more than male respondents. BMI-for-age showed that 80.9%, 14.5%, 1.8% and 2.7% of adolescents were normal, overweight, thin and obese, respectively. Mean DDS of all participants was 4.59 ± 1.38 : for male 4.28 ± 1.18 and significant difference in the DDS of male and female respondents was found ($P=0.170$). The results showed that 21.7%, 68.9% and 9.4% had low, medium and high DDS, respectively. Energy was adequately consumed (37.2%), protein and carbohydrates were excessively consumed (42.2%, 39.4%), and other nutrients were inadequately consumed. A significant difference between energy intake adequacy and DDS was found ($p=0.000$).

CONCLUSION AND RECOMMENDATION

Majority of the adolescents had moderate DDS and reasonable percentage had low DDS and a gender based significant difference was found. Diversification of food should be encouraged among adolescents regardless of their sex

DIETARY DIVERSITY CATEGORY BY GENDER

Dietary Diversity Category	Male N (%)	Female N (%)	Total N (%)	P-value
Low (1-3)	21(11.7)	18(10.0)	39(21.7)	0.039
Medium (4-6)	50(27.8)	74(41.1)	124(68.9)	
High (7-9)	3(1.7)	14(7.8)	17(9.4)	
Total	74 (41.1)	106 (58.9)	180 (100.0)	

*Significant at $p < 0.05$

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Determinants of Malnutrition among Under-five Children in Epe Local Government Area of Lagos State

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KEYWORDS: Malnutrition, under-five children

BACKGROUND AND OBJECTIVE:

Malnutrition in children, whatever the cause, affects negatively growth and development patterns where it can cause physical, cognitive and psychological impairment and consequently long-term disabilities including learning disabilities. It lowers resistance to infection and reduction in malnutrition would lead to a reduction in child mortality (1). This study examined the determinants of malnutrition among children under five years in Epe Local Government of Lagos State.

MATERIALS AND METHODS:

A descriptive cross-sectional study involving 107 under-five children and their mothers was conducted. Purposive sampling technique was used to select the participants. Anthropometric measurements were

taken using standard instruments while a validated semi structured questionnaire was used to elicit respondents' socio-economic characteristics. Data were analyzed using Statistical Package for Social Science SPSS Version 20. Prevalence of malnutrition (stunting, wasting, underweight, obesity and overweight) was determined using WHO Anthro, version 3.2 electronic software for U-5 children.

RESULTS

Results showed that the mean age of the children was 9.90 ± 1.35 . More than half (53.3%) were female. Prevalence of wasting, stunting, underweight, overweight and obesity were found to be 16.8%, 6.5%, 11.2%, 1.9% and 2.8%, respectively. Significant relationship between indicators of malnutrition and age of respondents, income of the parents and toilet facility were found.

Table 1: Association between respondents' socio-economic variables and malnutrition indicators

Variable	Height-for-Age	Weight-for-Height	Weight-for-Age
Age			
Chi-square (χ^2)	7.922	9.750	5.991
p-value	0.048*	0.371	0.112
Household Size			
Chi-square (χ^2)	3.264	5.310	0.771
p-value	0.196	0.505	0.680
Marital Status			
Chi-square (χ^2)	2.079	6.919	2.547
p-value	0.721	0.863	0.636
Income			
Chi-square (χ^2)	8.303	7.495	0.409
p-value	0.040*	0.586	0.938
Education Level			
Chi-square (χ^2)	4.768	11.620	3.349
p-value	0.190	0.236	0.341
Employment Status			
Chi-square (χ^2)	0.680	5.755	1.197
p-value	0.878	0.764	0.754
Toilet Facility			
Chi-square (χ^2)	6.349	9.433	2.376
p-value	0.042*	0.151	0.305
Source of Drinking Water			
Chi-square (χ^2)	5.688	8.428	2.070
p-value	0.224	0.751	0.723

* Significant at $p < 0.05$ level

CONCLUSION AND RECOMMENDATION

Age of respondents, income of the parents and toilet facility were the identified factors of malnutrition among the under-five children.

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Prevalence and Awareness of Hypertension among Artisans in Two Local Government Areas of Ebonyi State, Nigeria

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KEYWORDS: Prevalence, Awareness, Hypertension, , Artisans

BACKGROUND AND OBJECTIVE:

Malnutrition in children, whatever the cause, affects negatively growth and development patterns where it can cause physical, cognitive and psychological impairment and consequently long-term disabilities including learning disabilities. It lowers resistance to infection and reduction in malnutrition would lead to a reduction in child mortality (1). This study examined the determinants of malnutrition among children under five years in Epe Local Government of Lagos State.

MATERIALS AND METHODS:

A descriptive cross-sectional study involving 107 under-five children and their mothers was conducted. Purposive sampling technique was used to select the participants. Anthropometric measurements were measured using standard procedures. Data was analyzed using Statistical Package for Social Sciences (SPSS version 16.0). Descriptive statistics, T-test and Chi square test were analyzed.

RESULT AND DISCUSSION:

The mean age (in years) of participants was 30.5 ± 11.5 (males) and 30.5 ± 11.5 (females). The mean body mass index (BMI) was 23.8 ± 2.9 kg/m² (males) and 24.4 ± 3.7 kg/m² (females). The prevalence of prehypertension and hypertension was 33.1% and 14.8%, respectively).

The prevalence of hypertension was significantly higher in women (20.3%) than men (9.0%) ($P < 0.05$). Up to 70.0% male and 68.3%, female were not aware of hypertension while 81.8% male and 72.0% females had not checked their blood pressure before. Hypertension was comparable in urban and rural areas, 18.2% and 17.8% respectively.

CONCLUSION AND RECOMENDATION:

Approximately, one third of the population was prehypertensive although, the prevalence of hypertension was lower than the prevalence found in other studies in Nigeria (3). The result showed poor awareness of hypertension and poor monitoring of blood pressure. There is an urgent need for intensive health education in the communities to prevent and control non-communicable diseases in Nigeria.

Table 1: Age and anthropometric indices of the respondents

Parameters	Males N (%)	Females N (%)	Total N (%)
Age in years			
18-27	74 (24.6)	181 (56.6)	255 (41.1)
28-37	71 (23.7)	67(20.9)	138 (22.3)
38-47	50 (16.7)	43(13.4)	93 (15.0)
48 and above	105 (35.0)	29 (9.1)	134(21.6)
Total	300 (100.0)	320 (100.0)	620(100.0)
Mean Age (years)	30.3±11.8	34.6±13.4	32.5±1
Mean height (m)	1.60±0.1	1.63±0.1	1.62±0.1
Mean Weight (kg)	65.4±9.6	63.3±1.7	64.4±5.7
BMI			
Mean BMI(kg/m ²)	23.8±2.9	24.4±3.7	24.1±3.3
Underweight	4 (1.3)	16(5.00)	20(3.2)
Normal weight	187 (62.3)	250(78.1)	437 (70.5)
Overweight	101 (33.7)	33(10.3)	134 (21.6)
Obese	8 (2.7)	21(6.6)	29 (4.7)
Total	300 (100)	320(100.0)	620(100.0)

Table 2: Respondents' blood pressure, lifestyle, knowledge and practice of measurement

Parameters	Males N (%)	Females N (%)	Total N (%)
Blood Pressure Level			
Normal	164 (54.7)	159 (49.7)	323(63.6)
Pre-hypertension	109 (36.3)	96 (30.0)	205(33.1)
Hypertension	27 (9.0)	65(20.3)	92(14.8)
Total	300 (100.0)	320 (100.0)	620 (100.0)
Respondents' knowledge of high blood pressure			
Have you ever heard about hypertension?			
Yes	95 (31.7)	91(28.4)	186(30.0)
No	205(68.3)	229(71.6)	434(70.0)
Have you measured your blood pressure before?			
Yes	92(30.7)	29(9.1)	121(19.5)
No	216(72.0)	291(90.9)	507(81.80)
How often do you measure Your blood pressure?			
Daily	0(0.00)	0(0.0)	0(0.0)
Weekly	6(2.0)	6(1.90)	12(1.9)
Monthly	40(13.3)	44(13.8)	84(13.5)
Others	254(84.7)	270(84.4)	524(84.5)
Do you smoke?			
Yes	38(12.7)	13(4.1)	51(8.2)
No	262(87.3)	307(95.9)	569 (91.8)
Have you ever been advised to lose weight?			
Yes	2(0.7)	9(2.8)	11(1.8)
No	298(99.3)	311(97.2)	609(98.2)

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Evaluation of sex-gender differences in the dietary behaviour, fruit and vegetable intake knowledge, and their associations with hypertension

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KEYWORDS: Fruit And Vegetable Intake, Salt Intake, Salt Use Behaviour, Hypertension, Sex-Gender

BACKGROUND:

Hypertension being the leading cause of premature death globally affecting about 1.13 billion people is a major risk factor for cardiovascular disease morbidity and mortality [1]. Cardiovascular diseases (CVDs) are the leading cause of death in male and female sex-gender in low and middle-income countries (LMICs), accounting for 37% deaths in developing countries [2]. Dietary behaviours such as high intake of salt and low intake of fruit and vegetable have been associated with the risk of developing CVD risk factors including hypertension in LMICs [3]. In Africa, hypertension is prevalent in 27% male and 28% female, and the mean sodium intake in male and female are 5.8 and 5.3g/day, respectively with most population consuming below the recommended fruit and vegetable intake [4]. However, there is a dearth of information on the dietary behaviours, particularly the knowledge of FV intake and salt use behaviour among hypertensive patients by sex-gender. This information is crucial for proper identification of the most effective interventions needed to reduce the burden of hypertension. This study evaluated the sex-gender differences in the dietary behaviour, knowledge of fruit and vegetable intake and salt intake of hypertensive patients in selected hospital in Abeokuta.

METHODOLOGY: A cross-sectional survey of 300 hypertensive patients receiving treatment at Sacred Heart Hospital, Lantoro, Abeokuta was conducted. A simple random sampling technique was used to select respondents who gave their consent. Ethical approval was obtained from Sacred Heart hospital. Two dietary behaviours (salt use behaviour (SUB), and frequency of consumption of fruit and vegetable (FV)), and knowledge of FV intake, were investigated using validated questionnaires (a 7-item salt use behaviour, food frequency, and 20-item fruit and vegetable intake knowledge questionnaires, respectively). Respondents' responses on the salt use behaviour and FV intake knowledge questions were summed and scored. Salt use behaviour was classified as positive ($\geq 50\%$), and negative ($<50\%$) while FV knowledge was classified as poor (0-39%), moderate (40-69%) and good (70%). Frequency of consumption was categorized as inadequate (< 3 times/week) and adequate (≥ 3 times/week). Salt intake was estimated by urinary sodium excretion levels over 24 hours and classified as low ($<4\text{g/day}$), high ($\geq 4\text{g/day}$). Blood pressure was assessed using standard procedures. Chi-square and independent t-test was used to analyze cross-sectional association and significant differences between variables. Interactions between gender and dietary risk behaviour were added to test for sex-gender differences.

RESULTS: RESPONDENTS' PERSONAL CHARACTERISTICS, AND BIOCHEMICAL STATUS

About half (52.33%) of the respondents were male, 60.67% (were below 40 years of age, 53.67% were married, and 24.67% had tertiary education. The mean systolic, diastolic pressure and urinary sodium level of the respondents were 151.89mm Hg (95% CI= 149.65, 154.13), 83.94 mm Hg (95% CI=82.72, 85.16) and 202.19mmol (95% CI=99.28, 305.10), respectively. Most (85.37% (95% CI=81.25, 89.48)) respondents were hypertensive and 14.63% (10.52, 18.75) had elevated hypertension.

RESPONDENTS' DIETARY BEHAVIOUR, AND KNOWLEDGE OF FRUIT AND VEGETABLE INTAKE

Most (51.30%) respondents had adequate fruit and vegetable (FV) intake knowledge with more males having poor (6.25%) and good (51.90%) knowledge than their female (3.50% and 51.0%, respectively) counterpart. Similarly, most (82.9%) respondents had negative salt use behaviour with more males (84.21%) having poor salt use behaviour than females (83.33%). Likewise, salt intake was higher in males (15.63%) than females (8.49%, however, all the respondents had salt intake (\geq 4.0g/day) above recommendation. One in ten of the respondents had adequate fruit and vegetables consumption. There are significant differences in the poor FV intake knowledge ($p=0.04$) and mean salt intake ($p=0.04$) between male and female sex-gender.

FRUIT AND VEGETABLE INTAKE KNOWLEDGE, DIETARY BEHAVIOUR, AND THEIR ASSOCIATION WITH HYPERTENSION BY SEX-GENDER

All the respondents who had inadequate fruit and vegetable intake knowledge and good salt use behaviour were hypertensive. There were significant differences ($p<0.05$) between knowledge of fruit and vegetable intake and hypertension, as well as salt use behaviour and hypertension ($p<0.05$) among the respondents.

^bElevated blood pressure was defined as an average systolic blood pressure 120-129 mmHg, and average diastolic blood pressure < 80 mmHg. ^oHypertension was defined as an average systolic blood pressure ≥ 130 mmHg or average diastolic blood pressure ≥ 80 , FV – fruit and vegetable

CONCLUSION AND RECOMMENDATION

Poor FV intake knowledge and SUB were associated with hypertension among the two sex-genders equally. Intervention should be targeted to both male and female sex-genders to reduce the burden of hypertension.

Table 1: Knowledge of benefits of fruit and vegetable consumption, salt behaviour and salt intake of respondents

Variable	N	Male	Female	P-value
	Percent (95% CI)	Percent (95% CI)	Percent (95% CI)	
Total	300	144	156	
Knowledge score of fruit and vegetable intake (n=300)				
<i>Poor knowledge (n=14)</i>	4.70 (10.24, 18.14)	6.25 (4.58, 11.73)	3.50 (2.50, 4.77)	0.04*
<i>Moderate knowledge (n=132)</i>	44.00 (33.12, 48.11)	42.90 (32.09, 48.22)	45.50 (29.62, 44.79)	0.62
<i>Good knowledge (n= 154)</i>	51.30 (39.76, 57.45)	51.90 (37.51, 53.88)	51.0 (38.85, 54.48)	0.84
Salt use behaviour (n=283)				
<i>Negative (n=237)</i>	82.90 (78.63, 87.19)	84.21 (77.93, 90.49)	83.33 (77.30, 89.37)	0.31
<i>Positive (n=46)</i>	16.09 (11.81, 20.37)	15.79 (9.51, 22.07)	16.7 (10.53, 22.47)	-
Salt Intake				
<i>Mean Salt intake (g)</i>	11.82 (5.80, 17.84)	15.63 (8.86, 28.57)	8.49 (8.32, 8.65)	0.04*
<i>Salt intake (\geq 4g/day (n=286)</i>	100	100	100	

Table 2: Cross-sectional associations of knowledge of fruit and vegetables intake and salt use behaviour with hypertension

	^a Hypertension % (95% CI) n = 256	^b Elevated blood pressure % (95% CI) n = 44	χ^2	df	p-value
Knowledge score of FV intake					
Overall					
Poor knowledge (n=14)	17.37 (12.63, 22.12)	-	15.06	2	0.00***
Moderate knowledge (n=132)	42.45 (35.85, 48.20)	26.19 (12.32, 40.06)			
Good knowledge (n=154)	56.57 (50.39, 62.75)	73.81 (59.94, 87.68)			
Male (n=144)					
Poor knowledge	17.27 (10.10, 24.45)	-	9.15	2	0.01**
Moderate knowledge	39.09 (28.15, 45.99)	25.00 (6.32, 43.68)			
Good knowledge	43.64 (34.22, 53.05)	75.00 (56.32, 93.68)			
Female (n=156)					
Poor knowledge	17.78 (11.25, 24.31)	-	5.98	2	0.04*
Moderate knowledge	37.04 (28.79, 45.29)	27.78 (4.86, 50.70)			
Good knowledge	45.19 (36.68, 53.69)	72.22 (49.30, 95.14)			
Salt use behaviour (n=283)					
Overall					
Negative (n=237)	80.90 (75.16, 85.05)	100.00	9.57	1	0.00***
Positive (n=46)	19.10 (14.95, 23.84)	-			
Male (n=144)					
Poor	79.93 (72.48, 87.37)	100.00	5.49	1	0.01**
Good	19.07 (11.63, 26.52)	-			
Female (n=156)					
Poor	80.25 (73.55, 86.95)	100.00	4.09	1	0.04*
Good	18.75 (12.05, 25.45)	-			

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COVID-19 confinement/lockdown impact on food consumption pattern, physical activity and perceived body weight changes of undergraduates from selected three tertiary institutions in Southern Nigeria

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KEYWORDS:

BACKGROUND:

The growing global and regional prevalence of overweight and obesity characterized by poor dietary habits and physical inactivity amongst undergraduates is of public health concern [1]. As the closure of educational institutions for over six months was one of the stringent containment strategies employed by the government during the peak of COVID-19 pandemic outbreak, the impact of the measure on food consumption and body weight of Nigerian undergraduate students remains unknown. Therefore, this study was designed to assess the impact of COVID-19 confinement on dietary patterns, physical activity and perceived body weight status of Nigerian undergraduate students.

MATERIALS AND METHODS

This quasi-experimental study employed a purposive sampling technique to recruit 310 participants across three tertiary institutions; Michael Okpara University of Agriculture, University of Nigeria Nsukka and University of Ibadan. An online self-administered questionnaire was used to elicit responses on the dietary pattern, physical activity level and perceived body weight status at two intervals - before and during the peak of COVID 19 lockdown. These indicators followed standard procedures/protocols and were compared with standard references such as; modified food frequency questionnaire, International Physical Activity Questionnaire (IPAQ) short-form and BMI-based silhouette classification. Findings were subjected to statistical analysis using IBM SPSS Version 23.

RESULT AND DISCUSSION

Results revealed that the pattern of fruit (2.63 to 3.33 days/week), vegetable (2.86 to 4.58 days/week), legumes (2.54 to 3.37 days/week) and meat/fish (4.01 to 4.97 days/week) consumption significantly increased during the lockdown. Snacks (4.61 to 3.10 days/week), soft-drink (3.97 to 2.49 days/week) and dairy products (4.37 to 3.83 days/week) experienced a decline in consumption ($p < 0.05$). The physical activity MET score of respondents reduced from 3378.85 to 3097.02 MET minutes/week. Information on the perceived body weight status reported that lockdown accounted for an elevation in the prevalence of overweight/obese (11.0% to 23.9%). COVID-19 improved the dietary practices of the undergraduates but

significantly contributed to declining physical activity levels and elevated weight status. Similarly, several studies have reported that COVID 19 lockdown accounted for a decline in unhealthy food intake [2], physical inactivity [3] and weight gain [4] in young people.

Table 1: COVID-19 impact on mean weekly consumption pattern of undergraduates

Variables	Before the lockdown	COVID-19 lockdown	Mean difference	t; p-value
Fruit consumption	2.63 ± 1.86	3.33 ± 2.05	-0.71	-4.92; 0.00
Vegetable consumption	2.86 ± 1.91	4.58 ± 2.01	-1.73	-11.89; 0.00
Legume/nut intake	2.54 ± 1.67	3.37 ± 2.11	-0.83	-6.06; 0.00
Meat/fish intake	4.01 ± 2.81	4.97 ± 2.17	-0.96	-5.03; 0.00
Milk and dairy products	4.37 ± 2.03	3.83 ± 2.17	0.54	3.88; 0.00
Snacks consumption	4.61 ± 2.27	3.10 ± 2.25	1.50	10.07; 0.00
Soft drinks intake	3.97 ± 2.07	2.49 ± 2.11	1.48	9.90; 0.00

*Mean values denote days per week; number of times in a day were not considered;

Table 2: Covid-19 influenced physical activity and body weight changes

Variables	Before the lockdown		During the lockdown		t; p-value
	F	%	F	%	
BMI categories					-8.39; 0.00
Underweight	120	38.7	54	17.4	
Normal	156	50.3	182	58.7	
Overweight	20	6.5	44	14.2	
Obese	14	4.5	30	9.7	
Total	310	100	310	100.0	
Physical activity scores	3378.85 ± 3368.68 MET		3097.02 ± 3666.32 MET		4.37; 0.00
	minutes/week		minutes/week		

CONCLUSION:

The COVID-19 lockdown which significant improved healthy food intake but accounted for decline in physical activity and elevated weight status amongst the undergraduates. Thus concerted efforts should be made to improve school food environments with varied healthy foods and also encourage participation in indoor energy-exerting games/activities during times of confinement or restricted movement of young people.

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Anthropometric Characteristics and Risk Factors of Type II Diabetes Mellitus among Normoglycemic Non-Academic Staff of Rufus Giwa Polytechnic, Owo

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KEYWORDS: Non-Academic Staff, obesity, hypertension, Type II Diabetes Mellitus, chronic diseases

BACKGROUND:

Disruptions due to increased cost of food supply to food systems in Nigeria has led to high levels of household food insecurity resulting in nutrient inadequacy and poor nutritional status of under- 5 children [1]. This study was designed to evaluate household food insecurity (HFI), child dietary diversity (CDD) and anthropometric indices in under-5 children in selected households of Ibadan, Southwestern Nigeria.

MATERIALS AND METHODS:

The high prevalence of Diabetes Mellitus (DM) has constitute a public health menace to the burden of non-communicable disease that bewildered world of a recent. The prevalence has continued to increase in developing countries including Nigeria (1). The IDF projected that DM may affect about 41.4 million people by 2035 (2). In Nigeria, there has been an increase in the prevalence of DM affecting of all geographical zones. In a systematic review and Met-analysis done by Uloko *et al* (2017), the pooled prevalence of DM in Nigeria was found to be 5.77%. Type 2 diabetes is a common affliction in the elderly, the age of onset of type 2 diabetes is decreasing rapidly and has reached epidemic proportions in adolescents and young adults (3).

The high prevalence of diabetes mellitus had been heavily linked to frequent consumption of alcohol, poor dietary habits, elevated blood pressure and blood sugar, high body mass index and abdominal obesity (3). To successfully reverse the menace and plan intervention, viable data collection and knowledge of who is at risk of the diseases crucial. Hence the investigation of the Risk Factors of Type II Diabetes Mellitus among Normoglycemic Non-Academic Staff of Rufus Giwa Polytechnic, Owo

MATERIALS AND METHODS

A cross-sectional survey of three hundred (300) Non-Academic Staff of Rufus Giwa Polytechnic in Owo was conducted using a semi-structured interviewer-administered questionnaire. The questionnaire contained eight questions that assessed risk factors for T2DM. These risk factors were captured in a questionnaire, blood pressure was measured using digital sphygmomanometer in mmHg (4), while digital glucometer (oxmoron) was used to determine the blood glucose level of the respondents (2). A blood sugar level of ≤ 140 mg/dL is regarded as normal blood glucose, 141-190mg/dL is considered prediabetes, while a blood sugar level of ≥ 200 mg/dL suggests diabetes (5,6). Abnormal WC was defined as WC > 102 cm for males and 88 cm for females while lesser values was considered normal (7). Body mass index was calculated using the formula BMI (kg/m^2) =

CONCLUSION

In conclusion, there was presence of Overweight/Obesity (63%), abdominal obesity (57.7%), prediabetes (7.3%), hereditary (23.9%), high blood pressure (21%) among the respondents more particularly among females' participants. There is an urgent need to promote healthy lifestyle practices among the staff via health education and medical screening of all staff in the institution to rescue those at greater risk of diabetes and hypertension.

Table 1: Socio-Demographic Characteristics of the Subjects

Variables	Male(n=124(%))	Female N= 176(%)	Total (n=300(%))	X ²	P- value
Age					
20-29	3(2.4)	10(5.7)	13(4.3)	10.552	0.032*
30-39	16(12.9)	44(25.0)	60(20.0)		
40-49	57(46.0)	63(35.8)	120(40.0)		
50 -59	41(33.1)	54(30.7)	95(31.7)		
60 years	7(5.6)	5(2.8)	12(4.0)		
Total	124(100.0)	176(100.0)	300(100.0)		
Marital status					
Single	6 (4.0)	14 (7.9)	20(6.7)	3.356	0.340
Married	118(96.0)	57(32.4)	277(92.3)		
Divorced	0(0.0)	1(0.6)	1(0.3)		
Widowed	0(0.0)	2(1.1)	2(0.7)		
Total	124(100.0)	176(100.0)	300(100.0)		
Religion					
Christianity	118(95.2)	155(88.1)	273(91.0)	4.469	0.025*
Islam	6(4.8)	21(11.9)	27(9.0)		
Total	124(100.0)	176(100.0)	300(100.0)		
Tribe/ethnicity					
Yoruba	123 (99.2)	173 (98.3)	296(98.7)	0.446	0.452
Igbo	1(0.8)	3(1.7)	4(1.3)		
Total	124(100.0)	176(100.0)	300(100.0)		
Education qualification					
SSCE	4(3.2)	10(5.7)	14(4.7)	13.799	0.008*
ND/NCE	47(37.9)	87(50.6)	134(44.7)		
HND/B.Sc.	60(48.4)	72(40.9)	132(44.0)		
MSc. /Ph.D.	13(10.5)	5(2.8)	18(6.0)		
Total	124(100.0)	176(100.0)	300(100.0)		
Household size					
3	30 (24.2)	43(24.4)	73(24.3)	0.963	0.810
6	71(57.3)	102(58.0)	173(57.7)		
10	20 (16.1)	25 (14.2)	15(15.0)		
Above 10	3 (2.4)	6 (3.4)	9(3.0)		
Total	124 (100.0)	176 (100.0)	300(100.0)		
Monthly Income (N)					
No response	39(31.5)	84(47.7)	123(41.0)	15.552	0.016*
<20,000	11(8.9)	4(2.3)	15(5.0)		
21,000-30,000	7(5.6)	13(7.4)	20(6.7)		
31,000-40,000	9(7.3)	10(5.7)	19(6.3)		
41,000-50,000	6(4.8)	11(6.2)	17(5.7)		
51,000-60,000	6(4.8)	10(5.7)	16(5.3)		
Above 60	46(37.1)	44(25.0)	90(30.0)		
Total	124(100.0)	176(100.0)	300(100.0)		
Other source income					
No	55(44.4)	99(56.2)	154(51.3)	4.120	0.028*
Yes	69(47.3)	77(52.7)	146(48.7)		
Total	176(100.0)	176(100.0)	300(100.0)		
If yes, specify					
No response	57 (46.0)	98 (55.7)	155(51.7)	59.031	0.000*
Architect	2 (1.6)	0(0.0)	2(0.7)		
Barbing	3(2.4)	1 (0.6)	4(1.3)		
Business	6(4.8)	16 (9.1)	22(7.3)		
Electrician	6(4.8)	1 (0.6)	7(2.3)		
Farming	32 (25.8)	3(1.7)	35(11.7)		
Others	18 (14.5)	57 (32.4)	75(25.0)		
Total	124 (100.0)	176 (100.0)	300(100.0)		

*Significant at P< 0.05

Table 2: Factors Associated with Increased Risk of Diabetes Mellitus Among non-academic staff

Variables	Male(n=124(%))	Female 176(%)	Total 300(%)	X ²	P- value
Age					
20-44years	70 (56.4)	107(60.8)	177(59.0)	9.552	0.033*
45 and above	54(43.6)	70(39.2)	123(41.0)		
Total	124(100.0)	176(100.0)	300(100.0)		
Exercise to keep fit					
103(83.1)	162(92.0)	265(85.3)			
<30minutes	21(16.9)	14(8.0)	35(4.7)	5.694	0.014*
≥30minutes	124(100.0)	124(100.0)	300(100.0)		
Total					
Parents chronic disease experience					
24(20.4)	42(23.9)		1.528	0.466	
Yes	100(79.6)	134(76.1)			
No	124(100.0)	176(100.0)			
Total					
On BP medication					
14(11.3)	30(17.0)	44(14.7)	4.120	0.028*	
Yes	110(89.7)	146(83.0)	256(85.3)		
No	176(100.0)	176(100.0)	300(100.0)		
Total					
Consumption of fruits and vegetables					
53(42.7)	60(34.1)	113(37.7)	16.476	0.058*	
Yes	71(52.3)	116(65.9)	187(62.3)		
No	124(100.0)	176(100.0)	300(100.0)		
Total					
BMI (Kgm⁻²)					
≤ 24.9 (Normal)	60(28.6)	51(71.4)	111(37.0)	20.793	0.001*
>25.0 (overweight)	64(34.6)	125(65.4)	189(63.0)		
Total	124(100.0)	176(100.0)	300(100.0)		
Waist circumference					
34 (27.4)	73(41.4)	107(24.3)	86.182	0.002*	
<88<102cm (Normal)	90(72.6)	103(58.6)	193(57.7)		
>88>102cm (Excess)	124 (100.0)	176 (100.0)	300(100.0)		
Total					
Elevated BP					
≤140/≤80mmHg (Normal)	100(80.6)	137(77.8)	237(79.0)	2.451	0.448
>140/>80mmHg (elevated)	24(19.4)	39(22.2)	63 (21.0)		
Total	124(100.0)	176(100.0)	300(100.0)		
Elevated blood glucose level					
Normal glucose level	109(87.9)	169(96.0)	278(92.7)	6.252	0.019*
Elevated glucose level	15 (12.1)	7(4.0)	22(7.3)		
Total	124 (100.0)	176 (100.0)	300(100.0)		

*Significant at P< 0.05

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Proximate Composition and Sensory Properties of Complementary Produced from Maize, Soybean, and Tiger nut Flour Blends

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KEYWORDS: Proximate Compositions, Sensory Properties, Complementary Feeding, Maize, Soybean

ABSTRACT:

This study was carried out to assess the evaluation the proximate compositions of maize, soybean and tiger nut based infant food. Maize, soybean and, tiger nut was processed into flour. The following samples were formulated from the above flour ratios: MF- 100% Maize; MSTF1- 80% Maize, 10% Tiger nut 10%, Soybeans; MSTF2 - 60% Maize, 10% Tiger nut, 30% Soybeans; MSTF3- 50% Maize, 10% Tiger nut, 40% Soybean. The proximate composition was analyzed. The result showed that the sample MF (100% maize) has the best of sensory rating by panelist in term of appearance (7.45), colour (7.6), texture (6.9), aroma (6.75), and overall acceptability (7.4). MSTF3 (50% Maize, 10% Tiger nut, 40% Soybean) has the best of sensory rating in term of taste (6.85). The result also showed that MSTF1 (Maize: 80%, Tiger nut :10% Soybeans:10%) has the highest moisture content (9.92±0.04%) while MSTF2 (Maize:60%,Tiger nut:10%, Soybeans 30%), has the highest content in crude protein(7.23±0.03%,crude fibre(2.95±0.03%),crude

fat(1.78 ± 0.05), and ash($1.63 \pm 0.03\%$) than other blend also MSTF3(Maize:50%,Tiger nut: 10% Soybean: 40%) was higher in carbohydrate ($78.31 \pm 0.04\%$). ranking in terms of protein, ash, fat, fibre, moisture, energy and sensory attributes. The result showed that it can be recommended for children of 6 months to 3 years of age.

BACKGROUND AND OBJECTIVES

Infants and young children suffer from malnutrition in most developing countries. The growth of infant in the first and second year of life is very rapid and breast milk alone cannot meet the child's nutritional requirements. The infant needs supplementary feeding starting from 6 months. Many brands of preparatory foods have been developed and marketed; however, these brands are too expensive and therefore are not affordable to low-income families. The high price of proprietary weaning food and animal proteins combined with faulty feeding practices are mostly responsible for aggravating malnutrition among children (Kramer and Kakuma, 2001). Protein energy malnutrition (PEM) generally occurs during the crucial transitional phase when children are weaned from liquid to semi solid or fully adult foods. Children therefore require nutritionally balanced calorie-dense supplementary foods in addition to mother's milk. Faulty feeding practices are mostly responsible for aggravating malnutrition among children. Infant require nutritionally balanced calorie-dense complementary foods in addition to mother's milk. Several studies have reported that most of the infant foods consumed by children in many parts of developing nations are deficient in essential macro and micro nutrient. In view of this nutritional problem, several strategies have been used to formulate infant food through a combination of locally available under-utilized food crops that complement each other. The general objective is to produce a complementary food from a composite flour of maize flour, soybean flour and tiger nut flour and evaluate their chemical composition.

METHODOLOGY

Maize, soybeans, and tiger nut were purchased from a local market at Mushin in Lagos State Nigeria. They were sorted to remove any foreign particles. Maize, soybean and tigernut seeds were soaked in water for 24h, rinsed and oven dried for 10h. The dried seed were milled and sieved through a mesh screen and flour obtained was packaged and stored for further analysis. The flour obtained was sieved through a mesh screen and stored at room temperature. Proximate composition was carried by the method described AOAC, (2005). All analysis was conducted in duplicate and the data were all subjected to ANOVA (Analysis of Variance) and the mean was separated by DMRT (Duncan Multiples Range Test).

DISCUSSION

The proximate composition of complementary made from maize flour, soybean flour and tiger nut flour blends are shown in Table 1. The showed that there was significant difference between the moisture, ash, protein, fat, crude fibre and carbohydrate content was significantly different from each other. The results were also similar with those reported by Echendu el at. (2004). The differences were observed because the protein content of the infant food increase steadily with the addition of soybean flour as soybean have been reported be high quality source of protein which play preventive and therapeutic roles for several diseases (Grieshop et al., 2003). This addition effect was observed for ash, fat and fibre. Hence, the fat, ash and fibre content of the complementary food increase as the level of fortification with maize flour, soybean flour and tiger nut flour.

CONCLUSION

The study has shown that the infant food is safe, nutritious and natural. The acceptability level of the infant food in terms of colour, aroma, taste, texture and overall acceptability is based on the respondent who tasted the products. Addition of soybean flour and tiger nut flour into the maize flour was found to increase the iron and zinc level of the infant food. The products were accepted by the sensory panelists although a significant difference was observed between the control and the experiment samples used in the study. It can be concluded that locally sourced raw materials contain sufficient nutrient to produce infant food which can combat PEM and micronutrients deficiency among infants.

Table 1: Proximate Composition of composite flour blends

Sample	Moisture Content (%)	Crude Fat (%)	Total Ash (%)	Crude Fibre (%)	Crude Protein (%)	CHO (%)
MF	9.35±0.05	1.34±0.04	1.65±0.02	2.85±0.03	6.74±0.04	78.09±0.13
MSTF ₁	9.92±0.04	1.31±0.04	1.55±0.05	2.66±0.04	6.46±0.04	78.12±0.13
MSTF ₂	8.46±0.02	1.63±0.03	1.78±0.05	2.95±0.03	7.23±0.03	77.97±0.08
MSTF ₃	8.9±0.04	1.46±0.04	1.71±0.03	2.81±0.03	6.83±0.04	78.31±0.04

CHO=Carbohydrate

RECOMMENDATION

Based on the findings of this study, the following recommendations were made; 1 sample MSTF2 (60% maize flour,30% soybean flour and 10% tigernut flour) has the highest crude protein value from proximate and ash content from the analysis and it should be recommended for infant or children from 6months to 3years of age suffering from protein energy malnutrition.

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Effectiveness of Nutrition Education Intervention in modifying the Theory of Planned Behaviour Constructs for Intake of Soft Drink with Meals among Secondary School Adolescents in Abia State

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KEYWORDS: Nutrition education, Theory of Planned Behaviour, Soft drink,

BACKGROUND:

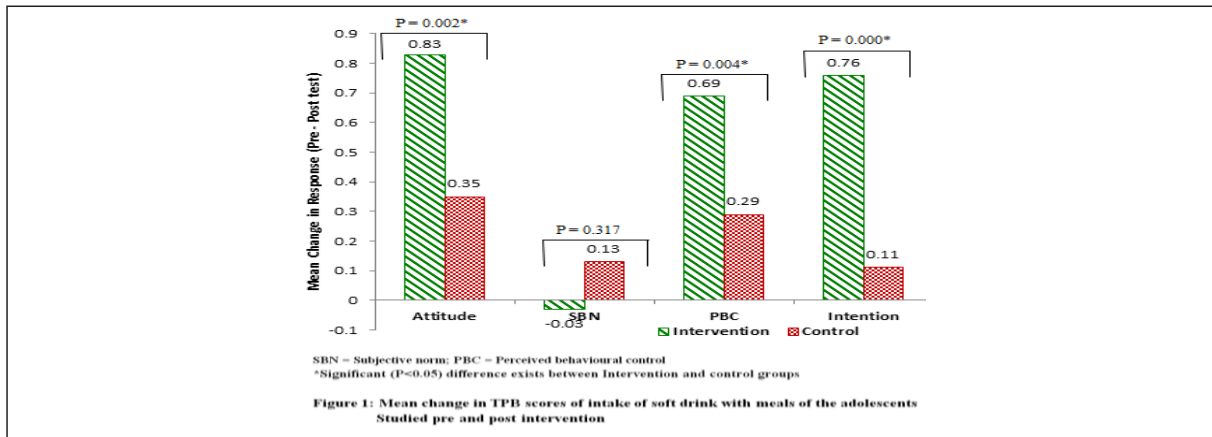
The Theory of Planned Behaviour (TPB) postulates three conceptually independent determinants of intention to perform a behaviour; this includes attitude, subjective norm and perceived behavioural control (PBC) (1). The more favourable the individual's attitude and subjective norm regarding the behaviour and the greater an individual's PBC; the more likely it is that the individual will intend to perform the behaviour (2). It is also believed that the stronger an individual's intention to perform a particular behaviour, the more successful they are expected to be (3). Poor dietary habits among adolescents are of concern because eating behaviour established in adolescence is likely to affect not only the health of an adolescent but also health and wellbeing in adulthood (4). Consumption of soft drinks (carbonated drinks) has been identified as one of the major dietary habit problems of adolescents (5, 6, 7). Nutrition education is a key element to promoting lifelong healthy eating and has long been recognised as a veritable tool for addressing most food related behaviour problems (8, 9). The ultimate goal of nutrition education is to change behaviour (10). The present study aimed at determining the effectiveness of Nutrition Education Intervention (NEI) in modifying the TPB Constructs for Intake of Soft Drink with meals among adolescents in Abia State, Nigeria.

MATERIALS AND METHOD:

This study was a prospective intervention study designed to obtain pre and post intervention information from adolescents (10 – 19 years) in selected government owned secondary schools in Abia State. Six schools were randomly selected from schools in the Ohafia zone and Aba Zones and purposively used for the NEI and control groups, respectively. All students that gave assent/consent and present during the study were sampled for this study. The self-administered TPB questionnaire was developed after focus group discussions with students and consisted of questions to elicit attitude, subjective norm, PBC and intention of the student. The NEI was administered to all the students in NEI group using three different methods – self-paced learning, peer and group discussion methods. Each student in the intervention group received a nutrition education handbook on soft drink. Mean changes in response for soft drink intake with meals were computed as the difference between the pre and post-intervention mean scores. Positive results reflected a positive change in the TPB after the nutrition education intervention. T-test was used to determine the difference in mean scores between the intervention and control groups and significance was judged as $P < 0.05$.

RESULTS AND DISCUSSION:

The result shows that students in the NEI group had significantly ($P < 0.01$) higher positive change in their attitude (0.83), PBC (0.69) and intention (0.76) than those in the control group (0.35, 0.29 and 0.11 respectively). This result implied that the students regarded intake of soft drink with meals as less beneficial, were less confident of taking soft drink with meals and had no intention of taking soft drink with meals after receiving the nutrition education intervention. The result in this study agrees with the report by Ha *et al.* (11) that nutrition education intervention significantly reduced the total quantity of soft drink consumed by young adults in USA.



CONCLUSION AND RECOMMENDATION(S):

This study has largely affirmed the effectiveness of specific behaviour targeted nutrition education intervention in positively modifying the Theory of Planned Behaviour determinants of intake of soft drinks with meals among adolescents.

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Body Mass Index And Quality Of Life Of Adults Living With Hiv In Selected Hospitals In Abeokuta, Ogun State

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KEYWORDS: HIV/AIDS, quality of life, BMI

BACKGROUND:

Nigeria has the highest population of people living with HIV/AIDS in the Western and Central Africa region, the second highest worldwide HIV epidemic and the largest proportions of fresh infections in Sub-Saharan Africa. This study assessed the body mass index and quality of life of adults living with HIV in Abeokuta, Ogun State.

MATERIALS AND METHOD:

Proportionate Stratified random sampling was used to select four hundred (400) adults living with HIV who accessed services from three selected health institutions (Federal Medical Centre, Sacred Heart Hospital and State Hospital Ijaiye, Abeokuta, Ogun State) in Ogun State. A semi-structured questionnaire was used to obtain information on demographic and health behaviours. The Quality of life refers to the degree of excellence in a person's life at any given period that contributes to satisfaction and happiness of the person and benefits society" (2). The respondents' QoL was assessed using the 26-item WHO QOL-HIV BREF and anthropometric measurements [Weight, Height, BMI, Waist circumference (WC), and mid-upper arm circumference (MUAC)] were taken using standard procedures. Categorical variables were analysed using chi-square, and continuous variables were analysed using T-test and correlation.

RESULTS AND DISCUSSION:

Acquired Immune Deficiency Syndrome (AIDS) is an illness brought about by a retrovirus known as Human Immunodeficiency Virus (HIV) that fights the body immune system cells and predisposes it to infections and diseases (3). Results show that 80.3% were females, 83.0% were married, 58.4% had formal education, 69.5% were self-employed, There were more female cases than male, probably due to reported high HIV/AIDS prevalence among females than males (3) and majority are married, This is in line with the research carried out by Laah and Ayiwulu (4). Also Mean age was 44.30 \pm 10.36 years; 41.5% of respondents received treatment from a private hospital, 30.7% from a federal hospital, while 27.9% from a state hospital. Half (55.1%) of the respondents had normal BMI, 7.9% were underweight, 23.4% were overweight and 13.6% were obese and the finding is supported by the study of Gabriel et al. (5) where majority of the respondents had normal BMI while few of the respondents were found to be obese. QoL across four domains revealed that 72.5% of the respondents had fair physical health, 41.3% had fair psychological health, 31.3% had fair environmental health, and 51.5% had good social health. BMI ($p < 0.01$) were significantly associated with physical health domain.

Table 1: Mean anthropometric parameters based on sex

Variables	Male N (77)	Female N (323)	Total N= (400)	p-value
Variables	Mean (SD)	Mean (SD)	Mean (SD)	
Age	47.45±9.96	43.53±10.36	44.30 ±10.36	0.003
Weight	70.21±13.51	64.24±13.71	65.32± 13.86	0.001
Height	161.72±40.47	156.38±29.4	157.42±31.85	0.000
MUAC	28.89±10.91	28.11±7.85	28.24 ±8.50	0.586
Waist C.	82.37±17.05	80.12±19.69	80.52 ±19.18	0.389
BMI	22.29±6.66	34.92±15.80	32.42 ±14.69	0.437

Table 2: Relationship between psychological health and body composition of respondents

	Poor	Fair	Good	df	χ^2	p-value
	N(%)	N(%)	N(%)			
BMI						
Underweig	3(0.8)	23(5.8)	15(3.8)	15	15.64	0.406
Normal	6(1.5)	85(21.3)	126(31.5)			
Weight						
Overweight	3(0.8)	33(8.3)	55(13.8)			
Grade 1	1(0.3)	16(4.0)	16(4.0)			
Obesity						
Grade 2	1(0.3)	8(2.0)	9(2.3)			
Obesity						
Total	12(3.0)	165(41.3)	221(53.3)			
MUAC						
Underweig	2(0.5)	11(2.8)	8(2.0)	9	8.816	0.454
Overweight	4(1.1)	71(17.8)	82(20.5)			
Obese	7(1.8)	76(19.0)	123(30.8)			
Morbidly obese	1(0.3)	7(1.8)	8(2.0)			
Total	12(3.0)	165(41.3)	221(55.3)			

CONCLUSION AND RECOMMENDATION(S):

The QoL in terms of physical health was fair, psychological and socio health was good. A positive association between respondents' BMI and QoL was observed. Nutritional education and counselling should be intensified at the ART centre by the dietitian/nutritionist to improve the knowledge of the adult about their body composition (BMI, WHR etc) which will ultimately contribute to the patients' sound health and good quality of life

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OC45

A Pilot Gardening and Nutrition Education Intervention to Improve School-Age Children's Knowledge, Preference and Consumption of Traditional Green Leafy Vegetables in Ibadan, Nigeria

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KEYWORDS: Vegetables, Gardening, Nutrition Education, Children

BACKGROUND AND OBJECTIVES:

Behavioural change interventions to 'catch children young' are necessary due to poor dietary habits especially low intake of vegetables and fruits, increase in quick-to-prepare, energy-dense simplified and ultra-processed foods (1, 2) which can predispose them to a range of childhood illnesses up to adulthood (3). Children's preferences for vegetables are consistently lower than for fruits (4) but vegetables are an important part of a healthy diet for all age groups. An innovative food system-based action is needed to

enable children learn and adopt healthy dietary practices (5). But there is little evidence of the impact of vegetable gardening and nutrition education, on consumption of traditional green leafy vegetables especially among school-age children. This study tested a combined tool of nutrition education and hands-on vegetable gardening to improve knowledge, preference and consumption of traditional green vegetables (TGLVs) among school-age children in Ibadan.

MATERIALS AND METHODS

The study adopted a pretest/posttest experimental design involving 25 school-age children (8 – 11 years) enrolled from a church summer vacation camp (SVC) in Ibadan. Intervention activities took place in the Department of Human Nutrition and Dietetics, and University of Ibadan teaching and research farm during the long vacation of schools (August – September, 2016). Interactive nutrition lessons (focussed on importance of vegetables in diet and health, identification of TGLVs and preparation of three simple recipes with harvested TGLVs from garden) were delivered two days a week for five weeks with complementary outdoor hands-on vegetable gardening (cultivation of three commonly consumed TGLVs: *Telfaira occidentalis* (*ugu*), *Celosia argentea* (*soko*) and *Amaranthus hybridus* (*tete*)). Intervention activities were hands-on and developed around the social cognitive theory (SCT), with objectives set to influence personal, behavioral, and environmental factors believed to positively influence dietary behaviours. Semi-structured questionnaires were used to collect data on socio-demographic, vegetable identification knowledge, exposure (if they had heard, seen or tasted the vegetables before), preference, asking behaviour (whether or not they ask for vegetables at home), at baseline (pre-test), and endline (post-test). Data were analysed using frequencies and percentages, means and standard deviations, paired t-test at α 0.05 for statistical significance.

RESULTS AND DISCUSSION

Mean age of the participants was 9.1 ± 0.9 years; 60% were boys. Following the intervention, there was an overall improvement in knowledge regarding identification of 10 TGLVs by name (pre-test: 3.45 ± 1.8 ; post-test: 4.59 ± 1.8 ; $p=0.02$) and exposure (pre-test: 32.1 ± 5.7 ; post-test: 36.5 ± 4.6 ; $p=0.03$) and preference (pretest: 13.4 ± 5.3 ; post-test; 18.1 ± 2.5 ; $p=0.001$) for TGLVs among the participants. There was a 31.7% ($p<0.05$) improvement from pre-test to post-test in the children asking for TGLVs at home and this was supported by data from the mothers which showed an 18.2% improvement, though $p>0.05$. Perceived self-efficacy evaluated at post-test only indicated that 21 (91.5%) of participants were willing to eat more TGLVs having participated in the programme; 17 (77.3%) willing to tell their friends to eat more TGLVs; and 18 (81.8%) willing to tell their mum to always cook TGLVs.

The results of this study show that nutrition education linked with vegetable gardening influenced ability to identify TGLVs, preference and asking behaviour, which are strong predictors of food consumption in homes. This is because the intervention placed great value on the 'garden-to-fork' experience of eating TGLVs. The findings from our study are in line with researches with similar interventions (3,4,5). Participants reported high levels of enjoyment of the hands-on experience of planting, nurturing and harvesting the TGLVs themselves, making simple recipes with and eating the meals (veggie noodles, veggie eggs and veggie sweet potato porridge) they prepared.

CONCLUSION AND RECOMMENDATION

Our findings suggest that hands-on gardening activities combined with nutrition education can influence knowledge, preference and consumption of TGLVs among children in the short-term. This should be introduced to primary schools in Nigeria to catch them young on vegetable consumption and healthy eating.

Table 1: Changes to individual outcome measure – pre-test, and post-test

	Mean ± standard deviation		
	pre	post	p-value
Knowledge (Mean±SD)			
TGLV identification by name	3.45±1.77	4.59 ±1.77	0.02*
TGLV exposure (Mean±SD)	32.1±5.7;	36.5±4.6;	0.03
Preference for TGLVs (1-10) (Mean±SD)	13.4±5.3	18.1±2.5	0.001
Asking behaviour n(%)			
1. Participant response	10(45.5)	17(77.2)	0.04
2. mother’s response	15(68.2)	19(86.4)	0.06
Self-efficacy n(%)	-		
1. eat more TGLVs having participated in the programme		21(95.5)	
2. tell my friends to eat more TGLVs		17(77.3)	
3. ask my mum to always cook TGLVs		18(81.8)	

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Independent Effects of Age and Energy Expenditure on Obesity among Adults in Abeokuta, Ogun State, Nigeria

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KEYWORDS: Age; Energy Expenditure; BMI, Rural/Urban

BACKGROUND:

All over the world, obesity has reached epidemic proportion with over 1 billion overweight people, with at least 30% of them being obese.(1). Baseline data are lacking and difficult to collect in some areas of the world. The purpose of this study was to assess the independent effects of age and energy expenditure on the risks of obesity among adults (20 - 64 years of age) in Abeokuta.

MATERIALS AND METHOD:

This study was a cross-sectional one, where changes in age, changes in work and leisure time, and changes physical activities which played important roles were assessed. In all, 240 adults of 120 females and 120 males (age: 20 - 64 yrs with cut-off for energy expenditure and Body Mass Index using WHO reference cut-off $\geq 30 \text{ kg/m}^2$ and WHO/FAO work classification (2)) in rural and urban localities in Abeokuta were randomly selected to participate in the study and assessed.

RESULTS AND DISCUSSION:

Physical activity information determined the energy expenditure, while the Body Mass Index determined the risk of obesity among the subjects. The prevalence of obesity was lower in the rural areas 24% as compared to urban areas 37.8%. The mean comparisons of the BMI in kg/m^2 with WHO cut-off values of obesity were shown in the figure. The mean total energy expenditure in kcal/d was 2635 ± 242 for males and 1732 ± 403 for females; and the mean were compared with the WHO energy expenditure reference values of physical activities.(1, 3) The risks of obesity in the rural and urban areas strongly increased with increased age across the gender, while energy expenditure contributed more to the risks among the urban population. Age has a strong and direct association with obesity in both rural and urban settings, while energy expenditure was inversely associated.

Table 1. Prevalence rate of obesity in the sample population

Sub-Population	Total Prevalence Rate	% obese	% obese
	(%obesity) n=240	(Male) n=60	(Female) n=60
RURAL	24	33	44
URBAN	37.8	66.7	77.8

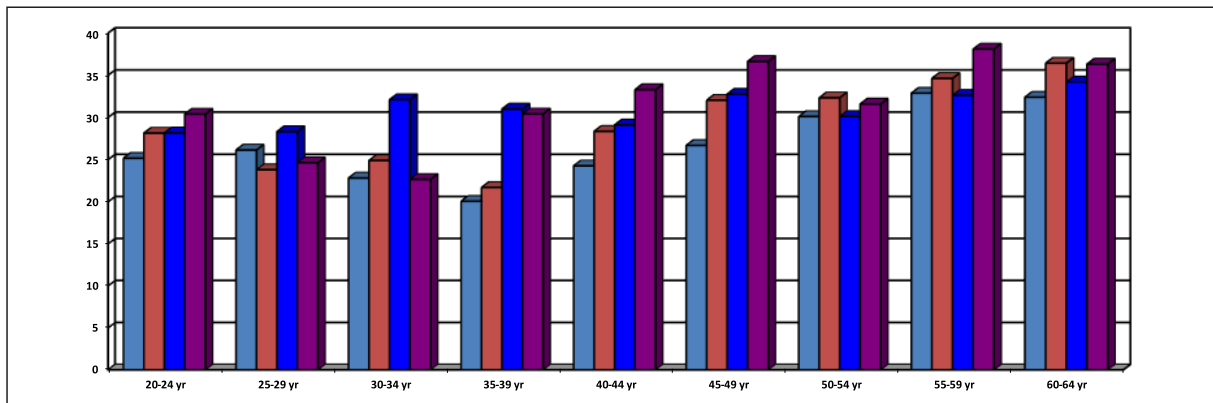
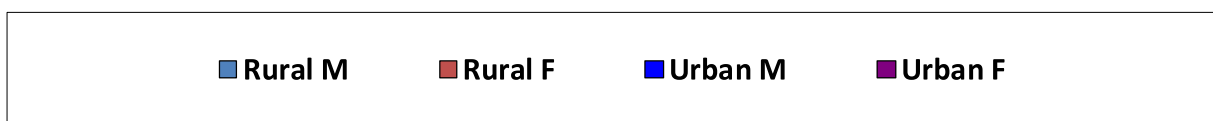


Fig 1. Comparisons of the mean values of BMI (kg/m^2) across the age groups (20-64 yrs)



CONCLUSION AND RECOMMENDATION(S):

Findings from this study showed that, age tends to be a risk factor for obesity, whereas energy expenditure tends to be protective by preventing and reducing the obesity incidents. Levels of education and economic development are relevant modifiers of the influences exerted by these variables. (4,5). In developed and developing societies, energy expenditure should be encouraged in the developmental programs of the people, in order to curb obesity epidemic.

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Impact of Nutrition Education on Automatic Fruit Selection Behaviour of Adolescents from Selected Secondary Schools in Abia State, Nigeria

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KEYWORDS: Nutrition Education, Automatic food selection, Adolescents

BACKGROUND:

The complexity of the foods available in the marketplace, pressures from advertisements and emerging health issues makes wise selection hard. Individuals are therefore constantly confronted, consciously or unconsciously, with the challenges of making right decisions on what to eat and why they should eat it [1]. An individual's behaviour is not simply a result of conscious goals and plans but rather of situational influences such as the sight or smell of tempting food [2]. Habit is an important factor in food selection. The notion that habits are automatic entails that they are performed efficiently, effortlessly, unconsciously, unintentionally, and with little controllability [3]. Despite the importance of automaticity in health behaviour, many studies still fail to include measures of automaticity [2]. Nutrition education is a key element to promoting lifelong healthy eating and has long been recognised as a veritable tool for addressing most food related behaviour problems [4,5]. This study aimed to determine the impact of nutrition education intervention (NEI) on adolescents' automatic (on the spot) selection of fruits, unhealthy snacks and soft drinks.

MATERIALS AND METHOD:

This study was a prospective intervention study designed to obtain pre and post intervention information from adolescents (10 – 19 years) in selected government owned secondary schools in Abia State. Six schools were randomly selected from schools in the Ohafia zone and Aba Zones and purposively used for the NEI and control groups respectively. All students that gave assent/consent and present during the study were sampled for this study. Different types of fruits, snacks and soft drinks locally available and sold within the community were displayed on a table in a classroom. The students were allowed, one at a time and without prior notification to select any food of their choice. Each student picked one of the food items displayed on the table; the picked food was recorded and returned to the table. No student was allowed to leave the classroom until all the students have picked. This prevented them from informing other students thus biasing the study. The NEI was administered to all the students in NEI group using three different methods – self-paced learning, peer and group discussion methods. Each student studied in the intervention group received a nutrition education handbook on fruit intake. The NEI was judged to have a positive impact if students that did not select fruits pre-intervention selected fruits post-intervention. Chi square test was used to determine the level of association of this impact between the intervention and control groups. Significant association was established as $P < 0.05$.

RESULTS AND DISCUSSION:

A total of 607 students were used for this study. In general more students in the intervention group (56.1%) selected fruits post intervention than in the control group. On individual level, the result shows that 45.8% of the students in the intervention group who did not select fruits pre-intervention selected it post-intervention as compared to 22.5% of those in the control group. The NEI in this study had a significant ($P < 0.01$) and positive impact on the students' automatic selection of fruits ($\chi^2 = 10.934$, $P = 0.004$). Although there is no available literature presently on the impact of nutrition education on automatic selection of fruits, but nutrition education has been established as an effective intervention strategy in promoting fruits and vegetables consumption among adolescents (6).

Table 1: Automatic selection of fruits by the adolescents studied pre and post intervention

Group	Pre Intervention		Post Intervention		Difference
	F	%	F	%	%
Intervention	87	27.1	180	56.1	29
Control	69	24.1	65	22.7	-1.4
Combined	156	25.7	245	40.6	14.9

F = Frequency of students that selected fruits,
% = Percentage of students that selected fruits

CONCLUSION AND RECOMMENDATION(S):

This study, which is one of the few studies that have studied automatic food selection of adolescents, has largely affirmed the effectiveness of specific behaviour targeted nutrition education intervention in impacting positive fruit selection behaviour change among adolescents.

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Lifestyle Characteristics and Health Status of Road Transport workers in Abeokuta, Ogun state.

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KEYWORDS: Lifestyle Characteristics, Blood Pressure, Blood Glucose, Physical Activity Road Transport Workers.

BACKGROUND:

Unhealthy lifestyle behaviours have been associated with hypertension and diabetes among road transport workers globally (Nwafor and Onya, 2019). Commercial road transport workers have been identified as eliciting behaviours that promote non-communicable diseases and road traffic accidents which has been a public health concern, (Adedokun, *et al.*, 2019), this study aims at assessing the relationship between the lifestyle characteristics, blood pressure and blood glucose level among road transport workers.

MATERIALS AND METHODS

A cross-sectional study was carried out among 200 road transport workers in the five major motor parks in Abeokuta, Ogun State using exhaustive population sampling method. Semi-structured questionnaire was used for data collection on respondents' socio-demographic characteristics, alcohol consumption and smoking. The International Physical Activity Questionnaire was used to collect data on their physical activity pattern. Blood pressure, anthropometric and blood glucose measurements were carried out. Data were analyzed using frequencies and percentages and Chi-square test.

RESULTS AND DISCUSSION

About 33% reported to have ever smoked. Majority (88.0%) had consumed alcohol, and 5.5% reported to have low physical activity. More than half (82.0%) of the respondents who consume alcohol have stage 2 hypertension, respondents who practice high physical activity have stage 2 hypertension (75.4%) and diabetes (66.7%). There is no relationship between low physical activity and normal blood pressure, also between smoking status and diabetes.

CONCLUSION AND RECOMMENDATIONS

This study concludes the alcohol consumption status of road transport workers contribute to the incessant rise of hypertension and other cardiovascular diseases. High prevalence of hypertension and relatively low prevalence of diabetes among road transport workers call for health awareness campaign and free health screening in motor parks for early detection and prevention of the non-communicable diseases.

Table 1: Relationship Between Lifestyle Characteristics and Blood Pressure

Variables	Frequency (%)		Stage 1 HTN	Stage 2 HTN	Total	P-value
	Normal	Elevated				
Physical Activity						
Low	0(0.0)	2(11.1)	8(12.3)	1(1.6)	11(5.5)	0.01*
Moderate	12(21.4)	0(0.0)	11(16.9)	14(23.0)	37(18.5)	
High	44(78.6)	16(88.9)	46(70.8)	46(75.4)	152(76.0)	
Total	56(100.0)	18(100.0)	65(100.0)	61(100.0)	200(100.0)	
Alcohol Consumption Status						
Yes	46(82.1)	14(77.8)	50(76.9)	50(82.0)	160(80.0)	0.86
No	10(17.9)	4(22.2)	15(23.1)	11(18.0)	40(20.0)	
Total	56(100.0)	18(100.0)	65(100.0)	61(100.0)	200(100.0)	
Smoking Status						
Yes	18(32.1)	2(11.1)	24(36.9)	21(34.4)	65(32.5)	0.22
No	38(67.9)	16(88.9)	41(63.1)	40(65.6)	135(67.5)	
Total	56(100.0)	18(100.0)	65(100.0)	61(100.0)	200(100.0)	

*P<0.05

Table 2: Relationship Between Lifestyle Characteristics and Blood Glucose

Variables	Frequency (%)			Total	P-value
	Normal	Prediabetes	Diabetes		
Physical Activity					
Low	7(3.9)	2(13.3)	2(33.3)	11(5.5)	0.04*
Moderate	33(18.4)	4(26.7)	0(0.0)	37(18.5)	
High	139(77.7)	9(60)	4(66.7)	152(76)	
Total	179(100.0)	15(100.0)	6(100.0)	200(100.0)	
Alcohol Consumption Status					
Yes	147(82.1)	10(66.7)	3(50)	160(80)	0.06
No	32(17.9)	5(33.3)	3(50)	40(20)	
Total	179(100.0)	15(100.0)	6(100.0)	200(100.0)	
Smoking Status					
Yes	62(34.6)	3(20.0)	0(0.0)	65(32.5)	0.12
No	117(65.4)	12(80.0)	6(100.0)	135(67.5)	
Total	179(100.0)	15(100.0)	6(100.0)	200(100.0)	

*P<0.05

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Household Food Insecurity and Undernutrition Among Children Aged 6 -59 Months in Ibadan, Southwestern Nigeria

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KEYWORDS: Household Food security, Dietary diversity, Children

BACKGROUND:

Disruptions due to increased cost of food supply to food systems in Nigeria has led to high levels of household food insecurity resulting in nutrient inadequacy and poor nutritional status of under- 5 children [1]. This study was designed to evaluate household food insecurity (HFI), child dietary diversity (CDD) and anthropometric indices in under-5 children in selected households of Ibadan, Southwestern Nigeria.

MATERIALS AND METHODS:

Using a multi-stage sampling technique, HFI and CDD were assessed using standardized measures namely Household Food Insecurity Access Scale (HFIAS) and Child Dietary Diversity Score (CDDS) respectively [2,3]. A statistically calculated sample of 405 apparently healthy mother- child pairs were interviewed from three local government areas in Ibadan metropolis, Nigeria. Nutritional status of children was assessed using anthropometric measures (stunting and wasting) and CDD food groups. Seven foods groups were used to describe CDD: (1) Grains, roots and tubers (2) Legumes and nuts (3) Dairy products (milk, yogurt, cheese) (4) Flesh foods (meat, fish, poultry and liver/organ meats) (5) Eggs (6) Vitamin-a rich fruits and vegetables (7) Other fruits and vegetables.

RESULTS AND DISCUSSION:

This study recorded a high prevalence of HFI (Figure 1). The proportion of male children from food insecure household was significantly higher than that of female children ($p=0.041$). About 10.7% of the children were experiencing wasting while 26.5% were either moderately or severely stunted. It was also found that older under-5 children (24-59months) have higher dietary diversity than the younger ones (6-23 months) whose main source of dietary intake was breast milk. Overall, there was higher consumption of foods that belonged to the cereals, grains, roots and tubers food groups compared with other food groups (Figure 2).

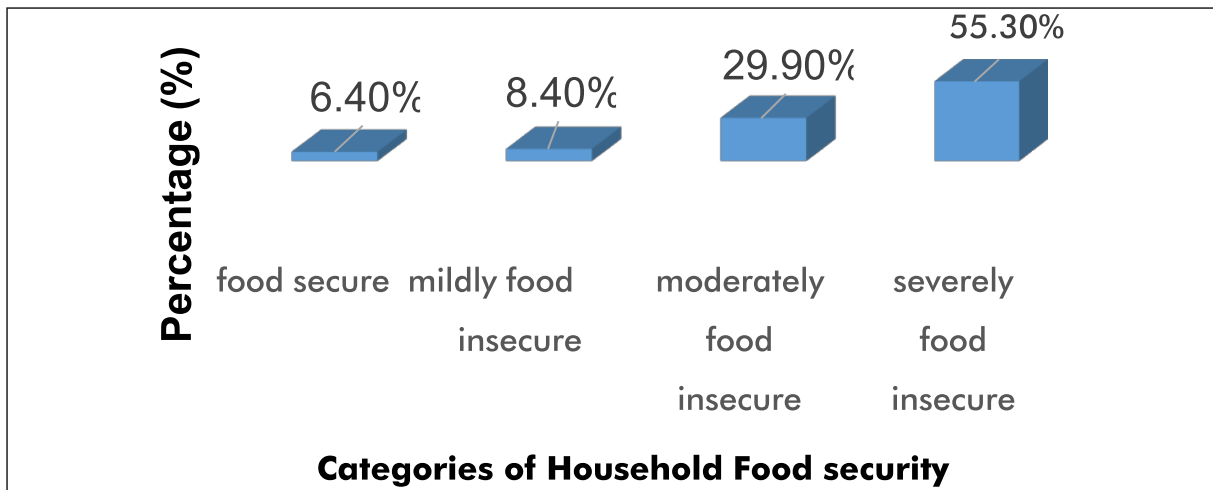


Fig. 1: Level of Household Food Insecurity of the respondents

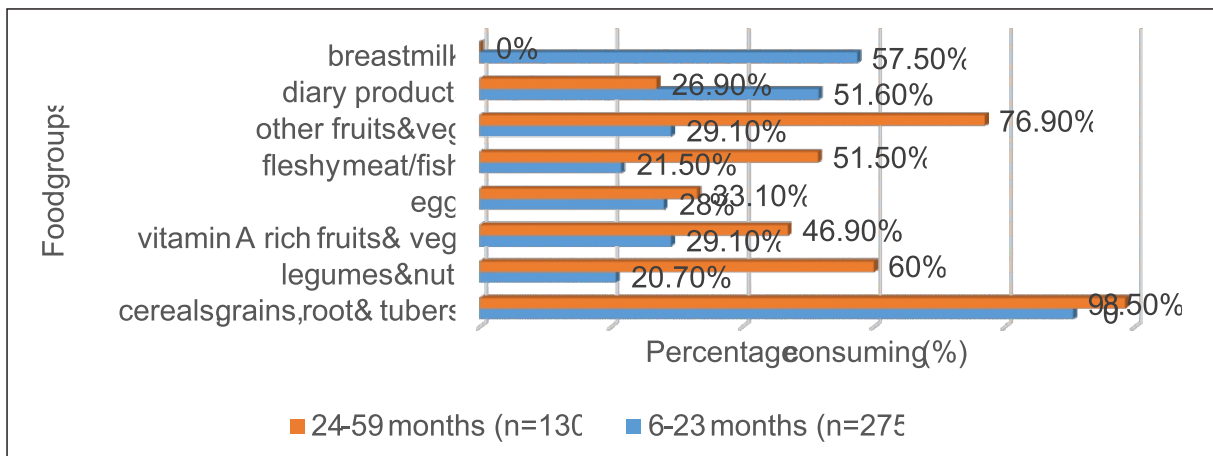


Fig 2: Food group classification based on age group

CONCLUSION AND RECOMMENDATION:

This study found a high prevalence of household food insecurity with substantial negative impact on nutritional status among children. The impact was however more evident with younger children who had lower dietary diversity. It is recommended that food-based nutrition-sensitive strategies be promoted to improve the household food security of residents of Ibadan, Nigeria.

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Understanding the interactions between sustainable food systems and nutrition in Nigeria: A systematic review and Meta analysis

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KEYWORDS: Food systems, Nutrition, Nigeria

BACKGROUND:

Sustainable food systems (SFS) and nutrition challenges are multifaceted problems whose solutions are contested and which go above institutional, disciplinary, and divisional boundaries and, requires synergistic amalgamation of actions taken by all stakeholders at global, regional, national and, local levels, across multiple sectors and fronts rather than a vicious clashing of the thoughts emerging from these diverse angles [1]. This study therefore attempts to address the limitations of many conventional research approaches to improving food security and nutrition, by using the qualitative meta-analysis approach which combines the research findings across the multiple fronts to show the interaction between SFS and Nutrition in Nigeria.

MATERIALS AND METHODS: Studies were accessed through the electronic web-based search mechanism, PubMed Central, Research for Life, Advanced Google Scholar, FAO, WHO, and Medline using keywords: sustainable food systems, nutrition and Nigeria for publications between 2000 and 2022. All articles published until June 30, 2022 were included in the study. The data extraction was conducted in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA 2009) guidelines. Reports, reviews, case series, and editorials were critically assessed and articles that met the aim of this review were further screened and examined using independent and combinations of key terms. Comprehensive meta-analysis version 3 was used to analyze the data. An I^2 test was used to assess heterogeneity while Funnel plot and statistical significance by Egger's test of the intercept was used to check publication bias. The final estimate was determined in the form of odds ratio by applying Duval and Tweedie's trim and fill analysis in the Random-effects model.

RESULTS AND DISCUSSION: Two hundred and eighty-one (281) studies were identified on the reviewed topic. However, only five studies fulfilled the inclusion criteria and were included in the analysis. The review outcome supports findings from Nigerian government and donors that Nigeria is going through a nutrition transition with an increase in urban obesity. It further found that urban populations are more likely to experience obesity and overweight while rural populations are more likely to experience undernutrition with the rural places beginning to catch up with urban obesity trends. In all of the studies included in the analysis, underweight and vitamin deficiencies were higher in the northern arid zones of the country, while overweight and obesity were higher in the southern zones. Childhood stunting and undernutrition were particularly acute in northern Nigeria. Almost half of all children in the northeast and northwest are reported to be stunted. More so, food systems had a significant interaction with stunting, consumer purchasing power, knowledge, and food price in Nigeria. The final pooled estimate in the form of the odds ratio for food systems and nutrition in Nigeria was found to be 4.01 (87% CI: 1.28, 2.41), random effect (five studies, $n=28,236$), $I^2=75\%$, $P<0.05$).

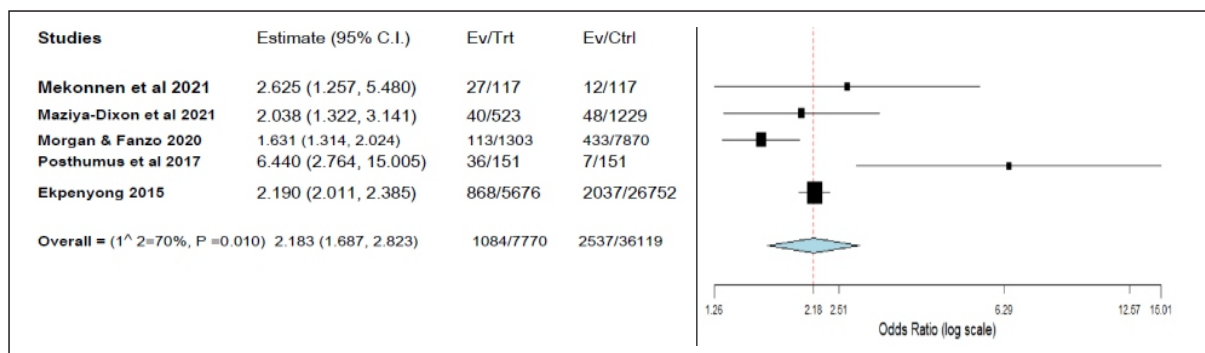


Fig. 1: Forest plot of five studies to show the interactions of SFS and nutrition in Nigeria

CONCLUSION AND RECOMMENDATION(S)

From the findings, the study concludes that SFS, obesity, and undernutrition are inexorably linked and, pointer loops amid them amplify unhelpful health and nutrition outcomes. The study therefore recommends amongst others the need for governments at all levels to create a conducive environment supported by effective food system policies that will lead to a society-wide behavioral change; and need for development practitioners and policymakers to see the bigger picture of SFS and nutrition interactions by facilitating multi-stakeholder collaboration and policy coordination at different levels to promote a more balanced relationship and jointly address future challenges of SFS and nutrition.

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Consumers' purchase reactions to perceived food price changes in Nigeria during COVID-19 outbreak

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KEYWORDS: Food systems, Nutrition, Nigeria

BACKGROUND:

The ripple effect of COVID-19 outbreak on all aspects of the economy, including the food system is alarming. Evidence have shown that food price is a major determinant of consumers' food choice and buying behaviour particularly amongst low socio-economic groups [1]. This study was designed to assess the food price changes and corresponding purchasing behaviours of consumers in eight Nigerian states.

MATERIAL AND METHODS

A descriptive cross-sectional study design was employed, a multi-stage sampling technique was used to select 160 food shoppers each from eight urban markets in eight Nigerian states. The states and urban markets were purposively selected, stratified sampling technique was used to ensure adequate representation of the various food market zones/lines (strata) in the selected urban markets. Food shoppers in each stratum were then randomly selected. A structured validated questionnaire was used to determine the degree of food price changes and respondents' corresponding purchase behaviours towards ninety (90) staple foods. The developed 5-point food price changes scale of 5, 4, 3, 2 and 1 denotes great (>100%), significant (50-99%), some (25-49%), little (<25%) and no increase respectively while a 4-point purchase decision scale which adapted from the food coping strategy index [2] were assigned as follows; 1 – purchase unaffected, 2 – reduced purchase frequency/amount; 3- food substitution; 4- cannot purchase/relied on assistance/palliatives. Descriptive statistics were computed for continuous variables and Pearson's bivariate correlation analysis used to examine the relationship between the variables, all analysis were done using IBM SPSS Version 23.

RESULTS AND DISCUSSION

Results revealed that the following raw food commodities had the mean highest price surge – rice (3.95 ± 1.21), spaghetti (3.79 ± 2.13), garri (3.90 ± 1.31), amala (3.80 ± 1.63), abacha (4.50 ± 0.71) semovita (3.50 ± 1.15), ewedu (4.04 ± 1.59), Efo soko (3.72 ± 1.62), almond (3.88 ± 1.69), chicken (3.64 ± 1.23) stock fish (3.52 ± 1.32), dry fish (3.70 ± 1.15), catfish (3.94 ± 1.05), sugar (3.79 ± 1.04). COVID-19 influenced price changes has been reported in Nigeria and other countries [3].

Owing to price changes, mean purchase coping strategies showed that key changes were made in their purchase decisions by reducing intake or substituting of the following foods; amala (2.28 ± 1.51), Abacha

(3.00 +2.83), cocoyam (2.47 ± 1.47), ridi (2.20 ± 0.90), cashew nut (2.19 ± 1.50), cocoyam (2.47 ± 1.47), leafy vegetables (2.0-3.4), almond (2.80 ± 1.35), date (2.03 ± 0.98), meat/fish products – mutton, pork, periwinkle, dryfish, stock fish, tilapia, cat fish (2.06-3.10), ogiri (2.00 ± 1.41), soft drinks (2.05 ± 1.16). A significant ($p < 0.05$) correlation was observed between price changes and purchasing decisions of most of the studied foods. Similarly, Ellision and Ocepek, [1] posited that price is a significant determinant of purchase decisions particularly during COVID-19 outbreak.

CONCLUSION: The consumers affirmed that food prices increased dramatically, and this significantly accounted for adoption of coping mechanisms in food purchasing.

Table 1 Association between food price changes and consumers purchase behaviour

Variables	Changes in price	Changes in purchase behaviour	Test of association
	Mean \pm S.D	Mean \pm S.D	r; p-value
Cereals and grains			
Rice	3.95 \pm 1.21	1.82 \pm 1.053	0.25; 0.00
Wheat	3.28 \pm 1.41	1.82 \pm 1.26	0.18; 0.00
Millet	3.15 \pm 1.49	1.99 \pm 1.39	0.19; 0.00
Maize	3.33 \pm 1.48	1.83 \pm 1.32	0.13; 0.03
Sorghum	3.31 \pm 1.45	1.88 \pm 1.28	0.20; 0.00
Breakfast cereals	3.12 \pm 1.13	2.03 \pm 0.91	0.13; 0.05
Roots and tuber			
Garri	3.90 \pm 1.31	1.39 \pm 0.53	-0.17; 0.08
Pounded yam	3.08 \pm 2.04	1.00 \pm 0.00	-
Alabo	3.35 \pm 1.52	1.66 \pm 1.45	0.17; 0.02
Amala	3.80 \pm 1.63	2.28 \pm 1.51	-0.43; 0.03
Abacha	4.50 \pm 0.71	3.00 \pm 2.83	1.00; 0.00
Yam	3.40 \pm 1.33	1.64 \pm 1.14	0.13; 0.02
Irish potatoes	3.20 \pm 1.43	1.80 \pm 1.20	0.22; 0.00
Plantain	3.15 \pm 1.45	1.72 \pm 1.27	0.20; 0.00
Legumes and nut			
Beans and products (Akara etc)	3.23 \pm 1.33	1.61 \pm 1.02	0.14; 0.00
Soyabean	3.44 \pm 1.39	1.86 \pm 1.24	0.33; 0.00
Bambaras nut (Okpa)	2.60 \pm 1.41	1.94 \pm 1.40	0.12; 0.04
African yam bean	2.43 \pm 1.59	1.78 \pm 1.68	0.33; 0.00
Cowpea	2.88 \pm 1.45	1.82 \pm 1.43	0.24; 0.00
Cashew nut	2.64 \pm 1.13	2.19 \pm 1.50	0.26; 0.00
Palmnut	2.45 \pm 1.54	1.80 \pm 1.68	0.19; 0.01
Dikanut (Ogbono)	2.80 \pm 1.67	1.56 \pm 1.50	0.32; 0.00
Vegetables/fruits			
Ewedu	4.04 \pm 1.59	2.20 \pm 1.50	0.49; 0.01
Spinach	2.43 \pm 1.18	1.49 \pm 0.79	0.23; 0.00
Lettuce	2.34 \pm 1.14	1.57 \pm 0.87	0.21; 0.00
Moringa	2.28 \pm 1.23	1.52 \pm 0.90	0.31; 0.00
Yakuwa	2.17 \pm 1.18	1.86 \pm 1.18	0.26; 0.00
Tomato	3.04 \pm 1.53	1.46 \pm 1.73	0.14; 0.01
Onion	3.12 \pm 1.57	1.32 \pm 0.77	0.21; 0.00
Pepper	3.16 \pm 1.50	1.55 \pm 1.05	0.22; 0.00
Carrot	2.73 \pm 1.45	1.56 \pm 1.19	0.13; 0.01
Garden Egg	2.46 \pm 1.28	1.67 \pm 1.01	0.20; 0.00
Cabbage	2.73 \pm 1.39	1.79 \pm 1.15	0.35; 0.00
Banana	3.13 \pm 1.34	1.66 \pm 1.09	0.15; 0.00
Pawpaw	3.04 \pm 1.19	1.96 \pm 1.03	0.23; 0.00
Pineapple	3.33 \pm 1.22	1.91 \pm 0.95	0.16; 0.03
Apple	3.43 \pm 1.31	1.97 \pm 0.93	0.29; 0.00
Watermelon	3.10 \pm 1.17	1.79 \pm 0.89	0.26; 0.00
Goruba	2.25 \pm 1.32	1.79 \pm 1.20	0.23; 0.01
Animal/fish products			
Beef	3.23 \pm 1.58	1.91 \pm 1.52	0.33; 0.00
Goat meat	2.47 \pm 1.59	1.99 \pm 1.42	0.28; 0.00
Mutton (Sheep)	3.19 \pm 1.51	2.06 \pm 1.47	0.14; 0.03
Pork	3.10 \pm 1.35	3.10 \pm 1.54	0.46; 0.01
Chicken	3.64 \pm 1.23	1.89 \pm 0.68	0.22; 0.00
Dry fish	3.70 \pm 1.15	2.74 \pm 1.47	0.19; 0.01
Stock fish	3.52 \pm 1.24	2.44 \pm 1.28	0.28; 0.00
Other essential commodities			
Palm oil	3.41 \pm 1.41	1.65 \pm 1.04	0.15; 0.01
Ginger	2.64 \pm 1.48	1.66 \pm 1.35	0.14; 0.01
Garlic	2.73 \pm 1.38	1.51 \pm 1.15	0.13; 0.03
Salt	2.56 \pm 1.44	1.26 \pm 0.98	0.15; 0.01
Sugar	3.79 \pm 1.04	1.86 \pm 0.95	0.32; 0.00
Soft drinks	2.92 \pm 1.41	2.05 \pm 1.16	-0.18; 0.01

*Only food prices that significantly ($p < 0.005$) affected purchase decisions were added

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Assessment of Socio-economic Status and Food Situation in Households during Covid-19 Pandemic Lock-down in AMAC, Federal Capital Territory, Abuja – A Descriptive Study

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KEYWORDS: Covid-19, socio-economic status, food availability, household

BACKGROUND AND OBJECTIVES:

During Covid-19 pandemic lock-down, movement was restricted and many markets were shut down resulting in food shortage and hunger. Food security is a situation in which all people, at all times, are free from hunger (1). This study assessed the socio-economic status and food situation in households during Covid-19 pandemic lock-down in AMAC Area Council of Federal Capital Territory (FCT), Abuja.

MATERIALS AND METHOD:

A community-based study using cross-sectional study design was carried out to randomly select respondents (N=400) in 21 settlements in AMAC FCT (Idu, Koroduma, Karmo, Jiwa, Gwagwa, Nyanya, Kurudu, Karu, Karshi, Orozo, Kugbo, Shereti, Karo-Majiji, Wuse, Garki, Utako, Lugbe, Gwarimpa, Apo, Jabi and Alita). A multi-stage sampling technique was used to select the respondents. A pre-tested, validated interviewer administered food frequency questionnaire was used to collect respondents' information on socio-economic status and household food situation during covid-19 pandemic lock-down. Responses to negative household food situation questions were categorized as 'Yes' = poor = 0 and 'No' = good = 1. Household food situation was then regrouped as good if $\geq 60\%$ (9/14) responded 'No' and also poor if $\geq 60\%$ answered 'Yes' (9/14) to each of the 14 food crisis questions during the lock-down. Descriptive statistics was used to describe and summarize data. Result was presented in tables as proportions and percentages.

RESULTS AND DISCUSSION:

Mean age of respondents was 41 ± 10.812 years. All the respondents in this study experienced income loss and responded 'yes' (>60 %) to the food crisis during covid-19 pandemic lock-down. Majority were worried about lack of food in their households (94.3%); felt hungry but no food to eat (73.0%), could not buy fruits (82.8%) and vegetables (79.0 %) and skipped meals (86.3 %) (Table 1).

Table 1: Household Socio-economic Status and Food Situation during Covid-19 Lockdown

S/N	Household situation during Covid-19 lock-down	Yes* Freq (%)	No* Freq (%)	Total (%)
1.	Did you experience income loss?	400(100.0)	0 (0.0)	400(100)
	Household food situation			
1	Worried not having food?	377(94.3)	23 (5.7)	400(100)
2	Unable to eat very good food?	374(93.5)	26 (6.5)	400(100)
3	Skipped meal?	345(86.3)	55(13.7)	400(100)
4	Ate only fu-fu, rice?	269(67.3)	131(32.7)	400(100)
5	Ate less amount of food?	339(84.7)	61(15.3)	400(100)
6	No food in the house?	303(75.8)	97(24.2)	400(100)
7	Felt hungry but no food to eat?	292(73.0)	108(27.0)	400(100)
8	Went without eating food the whole day?	244(61.0)	156(39.0)	400(100)
9	Price of food in the market is very high?	344(86.0)	56(14.0)	400(100)
10	Can't buy food at current price?	331(82.7)	69(17.3)	400(100)
11	Can't buy fruit due to high price?	355(88.7)	45(11.3)	400(100)
12	Can't buy meat due to high price?	357(89.3)	43(10.7)	400(100)
13	Can't buy tomatoes due to high price?	316(79.0)	84(21.0)	400(100)
14	Can't buy vegetable due to high price?	301(75.3)	99(24.7)	400(100)
	Mean responses	325 (82.2)	75(18.8)	400(100)

*Household food situation responses: Yes = Poor (≥ 60 %); No = Good (≥ 60 %).

CONCLUSION AND RECOMMENDATION:

During Covid-19 lockdown high percentage of the households experienced income loss and poor household food situation. Adequate food palliative measures during this type of pandemic is important.

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Anthropometric Status and Food Diversity of Peasant Farmers in Katagum (Azare) Local Government Area of Bauchi State

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KEYWORDS: Anthropometric Status, Food Diversity, Peasant Farmers

BACKGROUND:

Malnutrition is widespread in the entire country and rural areas are especially vulnerable to chronic food shortage, unbalanced nutrition, poor quality and high cost of food [1]. Lack of diversity is particularly severe problem among poor populations in the developing countries like Nigeria. The problem is critical in peasant farmers because they require additional energy and nutritious foods for their physiological and mental development [2]. This study assessed the anthropometric status and food diversity of peasant farmers.

METHODOLOGY: A cross-sectional descriptive study was conducted among a total of 228 adults male and female peasant farmers selected from different households in three wards in Azare Local government area (Garin Arab, Kwakudi and chara-chara) using systematic random sampling techniques. A pretested structured questionnaire was used to obtain information on socio-demographic data, food intake of respondents was obtained using 24-hour dietary recall techniques, and the dietary diversity score was obtained using Food and Nutrition Technical Assistance Project questionnaire (FANTA). Body mass index according to WHO classification was used in classifying the respondent nutritional status. Descriptive statistic was computed for different variables using Statistical Package for Social Sciences (SPSS) software version 21, correlation was used to assess the association between mean dietary diversity of the respondents and sex.

RESULT AND DISCUSSION: This study revealed that out of 228 respondents who participated in this study about 60% of them were within the physically active age (20-44 years). About 43% of the farmers had other source of livelihood. Ample numbers (82%) of them were educated, this is contrary to the study by Adeyemo and Kuhlmann [3], where over 40% of rural dwellers were illiterate. Sixty one percent were married with household number of 6 – 10. More than half (58%) had normal Body Mass Index (BMI) which could be because of more than one source of resources as well as involving in exercise (Farming). The dietary diversity score of the subject was poor. This finding is in consonance with the study by Nupo *et al.* [4] who reported that the dietary diversity score of the farmers were low but contrary to the study of same author Nupo *et al.* [5] reported high diversity among his respondents.

CONCLUSION AND RECOMMENDATION: More than half of the Peasant farmers in this study area had normal body mass index, however, there was also double burden of malnutrition. The food taken by the farmers here were monotonous, the respondents' dietary diversity score was low. Programme specific to improve farmers' food intake, functional capacity and economic status, should be encouraged.

Variables	Frequency	Percentage (%)
Sex		
Male	114	50
Female	114	50
Age		
21 – 30	81	35.5
31 – 40	41	18
41 – 50	47	20.6
51 – 60	33	14.5
61 – 70	26	11.4
Any other occupation?		
Yes	97	42.5
No	131	57.5
Level of education		
Primary	93	40.3
Secondary	54	23.7
Tertiary	45	19.7
Others	36	15.4
Marital status		
Single	71	31.1
Married	139	61.0
Widowed	7	3.1
Divorced	11	4.8
Family size		
1 – 5	64	28
6 – 10	94	41.2
11 – 15	30	13.2
16 and above	40	17.6

Table 1: Socio-demographic data of the Respondent

Variables	Frequency	Percentage
Underweight	43	18.85
Normal	133	58.33
Overweight	42	18.42
Obese	10	4.4
Total	228	100 (%)

Table 2: Table 4.2 Body Mass Index (BMI) Of the Respondents

Variables	Frequency	Percentage
Underweight	43	18.85
Normal	133	58.33
Overweight	42	18.42
Obese	10	4.4
Total	228	100 (%)

Table 3: Mean Dietary Diversity of the Respondents and According to Sex

Food group	Male mean	Female mean	P value	Remarks
Cereal and grain	47.9±0.01	50.8±0.2	0.23	No significant difference
Seed, nut and legumes	50.0±0.11	55.3±0.1	0.91	No significant difference
Starch roots and tubers	20.3±0.2	23.4±0.9	0.01*	
Vegetables	43.5±0.23	45.±0.01	0.44	No significant difference
Meat and meat product	10.5±0.3	14.6±0.3	0.05	
Fish and sea foods	5.5±0.1	7.9±0.2	0.01*	
Oils and dairies	24.3±1.84	29.4±0.9	0.75	No significant difference

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SUB-THEME D: FOOD COMPOSITION AND CONSUMPTION STUDIES

OD1

Knowledge, Attitude, Lifestyle and vegetable consumption pattern among civil Servants in Delta State.

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KEYWORDS: Knowledge, Attitude, Vegetable, Consumption.

BACKGROUND AND OBJECTIVE:

Vegetables are the most affordable and sustainable dietary sources of vitamins, trace elements and other bioactive compounds, and its improved production and consumption is thus regarded as the direct, low cost method for many of the urban and rural to increase micronutrient in their diet, thereby preventing micronutrient malnutrition. When vegetable consumption is compromised due to ones poor knowledge, attitude or lifestyle, the impact on ones nutritional status will be massive. This study was designed to assess the Knowledge, Attitude, Lifestyle and vegetable consumption pattern among civil servants in Delta State.

MATERIALS AND METHOD: The study design used in this work was survey study design and the data for the study were generated by interviewing 160 civil servants in Delta State. The respondents were selected using multistage sampling technique and the survey instrument was a carefully structured, validated and pretested questionnaire. Data obtained were on the subject's socioeconomic characteristics, different ways of eating vegetables, knowledge about vegetables and its benefits, etc., and their attitude towards vegetable consumption. Data generated were analyzed using statistical package for social sciences (SPSS version 20) and the results presented in frequencies and percentages.

Results and discussion: Most (51.2%) of the respondents were female while 48.8% were male. The age categories of the respondents were 31 to 43 years (47.5%), 44 to 56 years (26.3%), above 56 years (3.8%) and below 30 years (22.5%).

Table 1. Nutritional knowledge of the subjects in relation to vegetable and its consumption.

Majority (72.5%) of the respondents who answered "all of the above" had good knowledge about the major functions of vegetables in their daily meal. The level of knowledge of the respondents in terms of the illness(es) that could be prevented by adequate daily intake of vegetables were ascertained. The respondents who stated cancer (10.45%), and those who indicated obesity (41.9%) respectively had good

knowledge, while those who responded diarrhoea (5%), Dysentery (3.1%) had poor knowledge. The good knowledge depicted is in line with the study by Wang et al (1) who noted that increased consumption of vegetables has been recommended as a key component of a healthy diet for the prevention of non-communicable chronic diseases.

Table 1.1. Nutritional knowledge of the subjects in relation to vegetables and its consumption.

Variables	Good Knowledge		Moderate Knowledge		Poor	
	F	%	F	%	F	%
Knowledge						
Major functions of vegetables in our daily meal.						
It serve as a body building food	-	-	-	-	11	6.9
It helps in child growth	-	-	1	0.6	-	-
-						
It provides vitamins and mineral that promote heath	116	72.5	1	0.6	-	-
-						
All of the above	-	-	32	20	-	-
Adequate daily intake of vegetables can help prevent the following illness(es)						
Diarrhoea	-	-	-	-	8	5.0
Cancer	15	0.4	-	-	-	-
Dysentery	-	-	-	-	5	3.1
Obesity	67	41.9	-	-	-	-
None of the above	-	-	-	-	37	23.1
All of the above	-	-	-	-	28	17.5

CONCLUSION AND RECOMMENDATION:

Majority of the respondents had good knowledge about vegetables and its components. However, their consumption patterns are affected by seasonal variation and availability of varieties of vegetables. Nutrition education based on vegetable production, processing and preservation especially off-season should be conducted in order to improve the availability of certain vegetables during all season.

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OD2

Evaluation of nutritional composition, functional and sensory properties of complementary food made from sprouted beans and malted maize composite flour

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KEYWORDS: Malnutrition, Complementary Meal, Micronutrients, Sensory Properties

BACKGROUND:

Malnutrition is a significant public health problem globally with the highest prevalence in Sub-Saharan African [1]. There is need to develop nutritionally adequate and diversified home-made complementary food, using readily available and affordable local food crops that forms the bulk of the regular family meal in order to reduce malnutrition in under-five children. This study evaluated the nutritional, sensory and functional properties of complementary food made from malted yellow maize (*Zea mays* L.) and sprouted cowpea (*Vigna unguiculata*) flour blends.

MATERIALS AND METHODS: A simplex lattice research design with two variables namely, malted yellow maize (MMYM: 60-100%) and sprouted cowpea (SB: 0-40%) to give a total of five (5) experimental runs (MYM80:SB20, MYM₁₀₀:SB₀, MYM₉₀:SB₁₀, MYM60:SB40, MYM100:SB0, MYM70:SB30). The food materials were sorted, winnowed, steeped, rinsed, sterilized, sprouted, dried, milled, sieved (500 µm sieve), and packaged. The flour was formulated according to the experimental runs and used to prepare the complementary meal. The proximate, micronutrients, functional and sensory properties of the flour and complementary food formulations were analyzed. About 100 nursing mothers were used to evaluate the appearance, consistency, flavour, aroma and overall acceptability of the products using a 9-point hedonic rating. ANOVA was used to determine significant difference among variables and Duncan multiple range

test was used to separate means at $P < 0.05$.

Results: Proximate and micronutrient contents of complementary meal

The moisture, ash, fat, protein, carbohydrate, and crude fibre contents of the complementary food samples ranged from 88.42-91.48g, 1.06-1.53g, 0.37-0.55g, 1.14-1.68g, 0.62-4.06g, 0.68-8.30g, respectively. The calcium, magnesium, phosphorus, zinc, iron, copper, B-carotene, vitamins B12, E, and C contents of the complementary food formulations ranged from 0.27-0.76mg, 0.37-0.51mg, 0.16-0.48mg, 0.35-0.72mg, 0.39-0.77mg, 0.01-0.03mg, 0.12-0.18 μ g, 0.18-0.33 μ g, 3.88-14.19mg, 1.50-4.76mg, respectively. There are significant differences between the proximate and micronutrient composition of the flour and complementary food formulations. The MYM60:SB40 formulation had the maximum nutrient with a desirability of 0.736.

Functional And Sensory Properties Of The Flour And Complementary Meal Formulations

The bulk density, water absorption capacity, dispersibility, swelling capacity, lease gelation and foaming capacity of the flour formulations ranged from 0.76-0.80g/cm³, 1.41-1.60ml/g, 61.08-75.16cm³, 9.55-17.51%, 7.40-10.24cm³, and 10.78-17.17cm³). Samples B and C were most predominant in appearance and aroma (7.56 and 7.64, and 7.42 and 7.41) while sample C was predominant in flavour (7.82). However, samples B, C and E were predominant in overall acceptability (7.36, 7.56, and 7.33).

CONCLUSION AND RECOMMENDATION:

The addition of cowpea, sweet potato and fish improved the micronutrient contents of the complementary meal. Also, the fermentation of the crops improved the nutrient contents of the product.

Table 1: Proximate and micronutrient composition of ingredients, flour and complementary food formulations in 100g

S/n	Formulations	Moisture (g)	Ash (g)	Fat (g)	Crude Fibre (g)	Crude Protein (g)	Carbohydrate (g)	Calcium (mg)	Magnesium (mg)	Phosphorus (mg)	Zinc (mg)	Iron (mg)	Copper (mg)	β Carotene (μ g)	Vit. B ₁₂ (μ g)
Flour															
A	MYM100:SB0	9.65 \pm 0.04 ^a	3.63 \pm 0.03 ^a	3.26 \pm 0.02 ^a	3.75 \pm 0.01 ^a	59.17 \pm 0.08 ^a	20.58 \pm 0.06 ^a	0.60 \pm 0.01 ^b	0.47 \pm 0.01 ^b	0.40 \pm 0.01 ^d	0.45 \pm 0.02 ^c	0.41 \pm 0.01 ^a	0.03 \pm 0.01 ^a	0.12 \pm 0.01 ^a	0.22 \pm 0.01
	MYM90:SB10	9.35 \pm 0.02 ^a	2.53 \pm 0.03 ^a	4.14 \pm 0.03 ^c	2.21 \pm 0.01 ^a	25.36 \pm 0.03 ^a	56.46 \pm 0.05 ^a	0.26 \pm 0.01 ^a	0.42 \pm 0.01 ^d	0.54 \pm 0.01 ^c	0.41 \pm 0.02 ^a	0.69 \pm 0.02 ^c	0.02 \pm 0.01 ^c	0.20 \pm 0.01 ^d	0.33 \pm 0.01
	MYM80:SB20	9.61 \pm 0.04 ^b	2.45 \pm 0.02 ^a	4.20 \pm 0.01 ^{bc}	2.32 \pm 0.01 ^b	27.51 \pm 0.04 ^d	53.84 \pm 0.08 ^b	0.29 \pm 0.01 ^d	0.43 \pm 0.01 ^c	0.58 \pm 0.01 ^b	0.65 \pm 0.01 ^b	0.71 \pm 0.01 ^b	0.02 \pm 0.01 ^{bc}	0.21 \pm 0.01 ^c	0.39 \pm 0.01
	MYM70:SB30	9.83 \pm 0.03 ^c	2.57 \pm 0.01 ^c	4.27 \pm 0.05 ^b	2.46 \pm 0.01 ^c	34.34 \pm 0.01 ^c	46.55 \pm 0.11 ^c	0.61 \pm 0.01 ^a	0.53 \pm 0.01 ^a	0.61 \pm 0.01 ^b	0.82 \pm 0.03 ^b	0.79 \pm 0.01 ^a	0.03 \pm 0.01 ^d	0.21 \pm 0.01 ^b	0.36 \pm 0.01
	MYM60:SB40	10.01 \pm 0.03 ^d	2.76 \pm 0.03 ^b	4.59 \pm 0.03 ^a	2.50 \pm 0.01 ^d	37.13 \pm 0.01 ^b	43.03 \pm 0.03 ^d	0.43 \pm 0.01 ^c	0.40 \pm 0.01 ^a	0.29 \pm 0.01 ^a	0.41 \pm 0.01 ^d	0.53 \pm 0.01 ^d	0.03 \pm 0.01 ^{bc}	0.21 \pm 0.01 ^a	0.43 \pm 0.01
Complementary meal															
	MYM80:SB20	88.93 \pm 0.03 ^b	1.18 \pm 0.03 ^a	0.45 \pm 0.01 ^b	1.21 \pm 0.01 ^b	3.05 \pm 0.01 ^d	5.19 \pm 0.06 ^b	0.27 \pm 0.01 ^d	0.38 \pm 0.01 ^d	0.44 \pm 0.01 ^c	0.48 \pm 0.01 ^c	0.71 \pm 0.01 ^b	0.02 \pm 0.00 ^a	0.15 \pm 0.00 ^a	0.31 \pm 0.00
	MYM100:SB0	91.48 \pm 0.04 ^a	1.53 \pm 0.03 ^a	0.55 \pm 0.01 ^a	1.68 \pm 0.04 ^a	4.06 \pm 0.01 ^a	0.68 \pm 0.01 ^a	0.41 \pm 0.01 ^c	0.45 \pm 0.01 ^c	0.16 \pm 0.01 ^a	0.35 \pm 0.01 ^a	0.39 \pm 0.01 ^a	0.03 \pm 0.00 ^b	0.12 \pm 0.00 ^d	0.18 \pm 0.00
	MYM90:SB10	88.42 \pm 0.03 ^a	1.06 \pm 0.03 ^a	0.47 \pm 0.02 ^b	1.14 \pm 0.01 ^a	0.62 \pm 0.01 ^a	8.30 \pm 0.05 ^a	0.27 \pm 0.01 ^a	0.37 \pm 0.01 ^a	0.43 \pm 0.01 ^d	0.36 \pm 0.01 ^d	0.66 \pm 0.01 ^c	0.01 \pm 0.00 ^a	0.12 \pm 0.00 ^d	0.29 \pm 0.00
	MYM70:SB30	89.23 \pm 0.04 ^a	1.25 \pm 0.04 ^a	0.41 \pm 0.01 ^c	1.38 \pm 0.01 ^c	3.70 \pm 0.02 ^c	4.04 \pm 0.03 ^a	0.56 \pm 0.01 ^b	0.49 \pm 0.01 ^b	0.47 \pm 0.01 ^b	0.67 \pm 0.01 ^b	0.77 \pm 0.01 ^a	0.03 \pm 0.00 ^a	0.16 \pm 0.00 ^b	0.33 \pm 0.00
	MYM60:SB40	89.35 \pm 0.01 ^d	1.37 \pm 0.01 ^b	0.37 \pm 0.01 ^d	1.53 \pm 0.04 ^d	3.91 \pm 0.02 ^b	3.47 \pm 0.01 ^d	0.76 \pm 0.01 ^a	0.51 \pm 0.01 ^a	0.48 \pm 0.01 ^a	0.72 \pm 0.01 ^a	0.51 \pm 0.01 ^d	0.03 \pm 0.00 ^a	0.18 \pm 0.00 ^a	0.32 \pm 0.00

Values are presented with means \pm Standard Deviation, MYM - Malted Yellow Maize, SB - Sprouted Beans.

Column values of different superscripts are significantly different ($p < 0.05$).

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OD3

Effect of processing on the nutrient composition of some sorghum (*sorghum bicolor* L. Moench) products

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KEYWORDS: Sorghum, Processing, Nutrition Information, Nutrients.

BACKGROUND:

Sorghum (*Sorghum Bicolor* L. Moench) a member of poaceae family, has its origin from sub-Saharan Africa (1). Sorghum is ranked 5th most important crop after rice, wheat, maize, and barley in many regions of the globe including Asia, Africa, and Latin America (1). Sorghum has nutritional potentials that made it unique compared to other cereals crops more especially due to its polyphenols, including flavonoids, tannins, phytic acid (2) and a good source of proteins which is gluten free, this makes the crop suitable for individual with predisposition to immunological response (celiac disease) (2; 4). However, there is no clear evidence to the knowledge of present study that focused on the effect of processing methods on the nutrients content of sorghum products obtained on the nutrition information from the packages available online.

Consequently, the aim of this study is to investigate the effect of processing on the nutrient composition of sorghum products obtained online.

METHODS: An online search for nutrition information (nutrition facts) was conducted between the 4th – 25th July 2020 in the Oxford City. The search focused on three categories of sorghum products: sorghum grains n=10; sorghum flour n=10; and sorghum pasta n=10 (n is the number of products for each of the category). The study was designed to search for nutrition information on the macronutrients such as energy in kcal, carbohydrate, fat, fibre in g/100 g as shown on the package respectively.

The statistical analysis was performed using statistical package for social sciences (*IBM SPSS* version 24.0).

The data was checked for normality using *Shapiro-Wilks*.

STATISTICAL ANALYSIS: Significant differences among the categories were evaluated using a *Kruskal-Wallis H* test (one-way ANOVA equivalent) followed by *Bonferroni* correction of multiples comparison test. Statistical significance was set at $p < 0.05$.

RESULTS: There was no statistically significant difference in the carbohydrate and the energy for the three categories of sorghum products $\pi^2(2) = 5.728$, $p = 0.057$, with mean rank 10.15, 18.70 and 17.65 for grains, flour, and the pasta respectively. However, there is a statistically significant difference in the protein $\pi^2(2) = 9.257$, $p = 0.01$, with mean rank 18.85, 18.06 and 8.40 for grains, flour, and the pasta respectively. Fat $\pi^2(2) = 15.469$, $p = 0.001$, with mean rank 21.40, 18.30 and 6.80 for grains, flour, and the pasta respectively. Fibre $\pi^2(2) = 18.527$, $p = 0.00$, with mean rank of 18.83, 20.06 and 5.60 for grains, flour, and the pasta respectively (figure 1). Our findings show that processing has no statistically significant effect ($p \geq 0.05$) on the carbohydrate and energy of the three categories of the sorghum products, hence we reject the null hypothesis on energy and carbohydrate. This may be due to fact that some processing techniques improve the content of macromolecules such as carbohydrate, proteins, and lipids. Sorghum is very rich source of carbohydrate, energy, and protein.

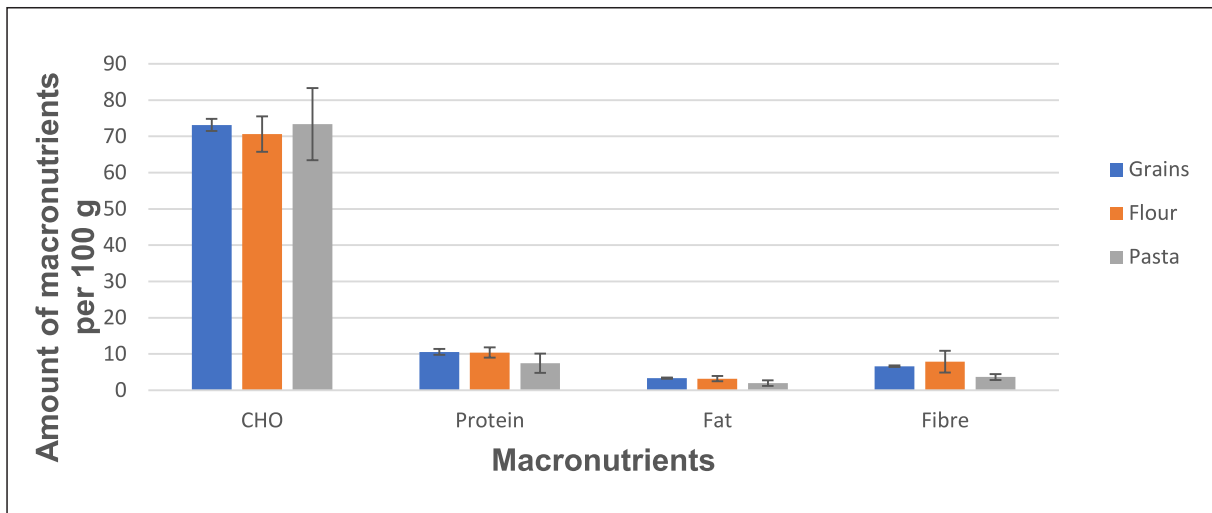


Figure 1. Effect of processing (from raw grains to milling and extrusion) on the macronutrients content of sorghum products g/100 g. Values are means with standard errors represented by vertical bars, $n = 10$ for each of the category, $p < 0.05$.

CONCLUSION AND RECOMMENDATION:

In summary, the findings of this research have shown that sorghum is an important source for carbohydrate, energy, and protein, however, it central that other nutrients such the minerals and vitamins of sorghum products are studied because of various processing methods.

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OD5

Comparative Analysis of the Proximate Composition of Wheat- whole Tiger nut Biscuits baked with margarine and avocado paste

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KEYWORDS: Biscuits, tiger nut, avocado pear, margarine, flour

BACKGROUND:

Biscuits are ready-to-eat, convenient and inexpensive food product made from wheat flour (1). The increase in consumer demand for convenient and nutritious food products with improved taste, safety and good shelf life at ambient temperature (2) has renewed interests and attempts to improve the nutritional quality and functionality of biscuits by enriching and supplementing wheat flour with a wide variety of nutrient rich cereals, pulses, fruits, tubers such as tiger nut and avocado pear. More so, there is improved awareness on the dangers of trans-fat, hence the drift away from consumption of margarine to healthier plant fat

consumption from fruits like avocado. The objective of this study was to evaluate the proximate composition of biscuits produced from wheat and whole tiger nut composite flour, while adopting avocado pear as a fat replacer.

MATERIALS AND METHODS: Wheat flour, avocado pears (Bacon variety), fresh tigernut tubers (brown variety) and other baking ingredients were purchased from commercial stockers at Ubani main market, Umuahia. Whole tigernut was processed into flour and blended with wheat flour at three different levels; 10, 20 and 30% weight basis into two parts. The first part of the composite (T10, T20, and T30) and the control sample (T00) were baked using margarine, while in the second batch (AT10, AT20, and AT30), the margarine was replaced with avocado paste (100%). The biscuits were analyzed for proximate composition using the method of AOAC (3). Data were subjected to Analysis of Variance at $p < 0.05$.

RESULTS AND DISCUSSIONS: Table 1 shows the proximate composition of the biscuit samples with different levels of whole tigernut flour and fat substitute (avocado paste). Ash, crude protein, crude fibre and fat content of the biscuit samples increased progressively with increasing substitution of wheat flour with whole tigernut flour from 0% to 30% for samples baked with either margarine or avocado pear. However, biscuits baked with fat substitute (avocado paste) had higher moisture, ash, crude protein contents, and comparative crude fibre content, but lower fat and carbohydrate contents compared to the values obtained for biscuits baked with margarine.

Table 1: Proximate composition (%) of biscuits samples from wheat-whole tigernut composite.

Samples	Moisture content	Ash content	Crude protein content	Crude fibre content	Crude fat content	Carbohydrate content
T00	6.64 ^d ±0.08	1.75 ^f ±0.01	8.22 ^f ±0.03	1.63 ^e ±0.01	13.22 ^e ±0.03	68.54 ^a ±0.14
T10	4.81 ^e ±0.01	3.85 ^d ±0.01	8.46 ^e ±0.06	5.69 ^d ±0.01	16.82 ^c ±0.01	66.44 ^b ±0.01
T20	7.51 ^c ±0.01	3.93 ^b ±0.01	8.87 ^c ±0.04	6.77 ^c ±0.02	17.42 ^b ±0.01	62.52 ^d ±0.07
T30	4.67 ^e ±0.05	3.95 ^b ±0.01	9.18 ^b ±0.03	6.88 ^a ±0.02	18.37 ^a ±0.02	63.97 ^c ±0.12
AT10	11.90 ^a ±0.01	3.89 ^c ±0.01	9.15 ^b ±0.01	6.81 ^b ±0.02	16.77 ^c ±0.04	58.48 ^f ±0.02
AT20	10.47 ^b ±0.01	3.77 ^e ±0.01	8.65 ^d ±0.01	6.73 ^{cd} ±0.01	15.73 ^d ±0.01	61.67 ^e ±0.03
AT30	10.59 ^b ±0.35	4.15 ^a ±0.02	9.41 ^a ±0.01	6.87 ^a ±0.01	17.40 ^b ±0.01	58.57 ^f ±0.42

a-f: Values are means ± s.d of duplicate determination. Mean value in the same column but with different superscript are significantly different ($P < 0.05$). T00 = 100% wheat flour: 0% whole tigernut flour. T10 = 90% wheat flour: 10% whole tigernut flour (T10). T20 = 80% wheat flour: 20% whole tigernut flour. T30 = 70% wheat flour: 30% whole tigernut flour. AT = samples containing avocado paste as a fat substitute.

CONCLUSIO: The findings from this study revealed that replacing margarine with avocado pear resulted in biscuits with improved mineral and protein content, but high moisture content which may reduce storage-ability of the product.

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Proximate composition, Antinutritional factors, minerals analyses and Invitro antioxidant potentials of Orange fleshed sweet potato (OFSP) leaves

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KEYWORDS: Orange flesh sweet potato leaves

BACKGROUND AND OBJECTIVES:

Leafy vegetables are major sources of vitamins, dietary fibre, essential amino acids and antioxidants. These vegetables can reduce the incidences of malnutrition and stunting among vulnerable groups (women and children) in Nigeria; which can lead to deficiency diseases capable of increasing morbidity and mortality rates. More than two billion people who live in low-income Countries are affected globally by 'hidden hunger' particularly due to the deficiency of vitamin A, iodine, iron and zinc. Recently, the orange-fleshed sweet potato (OFSP) roots and leaves has been attracting food technologists and Nutritionists because it is a naturally bio fortified root crop which can be useful in combating nutrient deficiency diseases. This present study aims to evaluate the proximate, minerals, antinutrients and invitro antioxidant potentials of OFSP leaves. The present study also aims at solving the arguments of how possible it is for low-income earners to eat quality meal and how useful is OFSP leaves in addressing food security. The present study seeks to analyse the proximate, minerals, antinutrients and invitro antioxidant potentials of OFSP leaves and compare the results with fluted pumpkin leaves which have been proven to be good source of major nutrients.

MATERIALS AND METHODS

The fresh leaves of Orange fleshed sweet potato (*Ipomoea batatas*) were purchased from Michael Okpara University of Agriculture farm, Nigeria. The plant was identified by the Department of Plant Biology and Biotechnology, University of Benin and authenticated in the same department. A voucher specimen number, UBH-I493 was deposited at the Herbarium of Department of Plant Biology and Biotechnology, University of Benin.

The OFSP leaves were washed to remove impurities and chopped into small pieces and air dried under shade to a constant weight. The dried samples were ground to powder, passed through a 0.5mm mesh and kept at 4°C and stored protected from light, oxygen and heat.

The dried samples were extracted with water and methanol to obtain aqueous and methanolic extract. The crude samples were screened for phytochemicals, and analysis for proximate constituents were carried out using the standard methods of Association of Official Analytical Chemists. Minerals and invitro antioxidant properties were also analysed using standard methods on aqueous and methanolic extract of the samples.

RESULTS AND DISCUSSIONS The dried OFSP leaves showed promising antioxidant activities with significantly higher $P \geq 0.05$ total phenolic and flavonoid content; which was measured as DPPH and ABTS value. The protein, fiber and ash (magnesium, potassium, calcium, iron, selenium and zinc) of the OFSP leaves were also significantly higher $P \geq 0.05$ in comparison to 'pumpkin leaves' a commonly used green leafy vegetable.

Table 1: Proximate composition and antinutritional factors of orange fleshed sweet potato leaves compared to fluted pumpkin

Parameters	Pumpkin 1	Pumpkin 2	OFSP Sample 1	OFSP Sample 2
Moisture (g/100 g)	12.13±0.55 ^a	11.69±0.27 ^b	12.40±0.19 ^c	11.25±0.34 ^a
Protein (g/100 g)	3.29±0.40 ^c	3.33±0.12 ^c	5.65±0.05 ^b	5.84±0.07 ^a
Fat (g/100 g)	0.56±0.03 ^b	0.41±0.05 ^b	0.70±0.01 ^a	0.63±0.03 ^a
Ash (g/100 g)	2.89±0.01 ^b	2.97±0.01 ^b	3.32±0.06 ^a	3.39±0.01 ^a
Crude fiber (g/100g)	2.36±0.11 ^b	2.25±0.07 ^b	2.68±0.10 ^a	2.51±0.13 ^a
Insoluble dietary fiber (g/100 g)	2.41±0.01 ^b	2.72±0.01 ^a	2.31±0.01 ^b	2.17±0.01 ^c
Soluble dietary fiber (g/100 g)	1.97±0.01 ^a	1.69±0.02 ^c	1.86±0.04 ^b	1.88±0.01 ^b
Total dietary fiber (g/100 g)	4.38±0.03 ^a	4.41±0.05 ^a	4.17±0.01 ^b	4.05±0.01 ^b
Zinc (mg/100g)	2.86±0.01 ^b	2.54±0.03 ^b	3.67±0.07 ^a	3.85±0.11 ^a
Antinutritional factors				
Phytic acid (mg/100g)	0.03±0.00 ^a	0.02±0.01 ^a	0.01±0.00 ^a	0.01±0.01 ^a
Tannins (mg/100g)	0.18±0.04 ^a	0.15±0.03 ^a	0.13±0.01 ^a	0.11±0.01 ^a

Mean± standard deviation of triplicates

Means with no common letters within a row significantly differ ($p \leq 0.05$). All values are on dry weight basis

CONCLUSION AND RECOMMENDATION: This study shows that the dried leaves of OFSP is a functional food and is a good source of proteins, minerals (especially zinc) and antioxidants. The leaves can be used to alleviate the problems of seasonal food insecurity, malnutrition and stunting in Nigeria.

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Proximate Compositions Of Selected Locally Vended Street Snacks Commonly Consumed In Ogun State

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KEYWORDS: Proximate qualities, locally vended, street snacks, Ogun state

BACK GROUND AND OBJECTIVE:

The preparation and sales of street vended snacks is an age old activity. The proximate composition of locally vended snacks: maize cake (*aadun*), melon cake (*robo*) and plantain chips (*ipekere*) commonly consumed in Ogun state was investigated.

MATERIALS AND METHOD:

Specimens for the investigation were purchased from four localities in Ogun State: Ita oshin Garage in Abeokuta, Lagos Garage in Ijebu Ode, Sagamu Garage in Remo and Ilaro Garage in Yewa areas respectively. The proximate composition of the samples were determined using standard methods [1]. Data obtained were subjected to analysis of variance using SPSS version 21.0

RESULTS AND DISCUSSION

TABLE 1: PROXIMATE COMPOSITION OF VENDED SNACKS IN (%)

Sampl		Moisture	Fat	Ash	Fibre	Protein	Carbohydrat
Robo							
	Remo	8.59±1.80 ^b	38.58±0.81 ^b	5.60±0.18 ^b	6.43±0.11 ^a	30.7±0.72 ^a	10.11±0.02 ^a
	Yewa	14.02±1.54 ^a	36.54±0.53 ^c	5.20±0.11 ^c	6.01±0.16 ^b	28.80±0.49 ^b	9.44±0.25 ^b
	Ijebu	15.90±0.75 ^a	35.71±0.38 ^c	5.36±0.04 ^c	5.82±0.13 ^b	28.18±0.37 ^b	9.04±0.18 ^b
	Abeokuta	5.21±0.81 ^b	40.06±0.11 ^a	6.05±0.04 ^a	6.72±0.16 ^a	31.75±0.24 ^a	10.22±0.26 ^a
Ipekere							
	Remo	8.92±0.23 ^a	27.25±0.18 ^b	2.16±0.04 ^a	3.08±0.08 ^b	2.12±0.05 ^b	51.49±0.02 ^b
	Yewa	6.64±0.07 ^b	28.71±0.03 ^a	2.06±0.02 ^b	3.39±0.03 ^a	2.46±0.01 ^a	51.74±0.03 ^b
	Ijebu	8.97±0.24 ^a	26.10±0.08 ^b	2.10±0.01 ^b	3.26±0.07 ^a	2.20±0.02 ^b	51.46±0.24 ^b
	Abeokuta	5.99±1.16 ^b	28.64±0.25 ^a	2.07±0.04 ^b	3.41±0.02 ^a	2.34±0.17 ^{ab}	57.56±0.68 ^a
Aadun							
	Remo	3.45±0.58 ^c	40.54±0.26 ^a	2.41±0.06 ^a	7.88±0.06 ^a	10.05±0.10 ^a	35.69±0.10 ^a
	Yewa	7.90±0.38 ^b	38.54±0.20 ^b	2.29±0.08 ^a	7.60±0.09 ^b	9.71±0.08 ^{ab}	33.97±0.50 ^b
	Ijebu	10.0±0.98 ^a	37.78±0.37 ^b	2.26±0.04 ^a	7.30±0.09 ^c	9.33±0.16 ^b	33.34±0.33 ^b
	Abeokuta	5.78±1.66 ^{bc}	18.40±1.08 ^c	1.09±0.06 ^b	3.48±0.14 ^d	4.59±0.27 ^c	14.76±0.15 ^a

Mean with different superscripts on the same column are significantly different ($p < 0.05$)

The protein content of *Robo*, *Ipekere* and *Aadun* are significantly ($p > 0.05$) higher in samples collected from Abeokuta, Remo and Yewa respectively. Crude protein content of *Aadun* is within the range reported by [4]. However, protein content of *Robo* and *Ipekere* are lower compared to the result of [3] and [5]. The fibre, ash and fat content of the specimens are significantly ($p > 0.05$) higher in samples collected from Abeokuta and Remo respectively. Highest ash content of *Robo* reported from Abeokuta is also lower compared to the result reported by [3]. Crude fat of *Aadun* reported from three of the regions are within the range reported by [4], [2] and fat content of *Ipekere* is higher compared to the report of [5] respectively. The snacks are rich in mineral and its fibre is known to promote satiety. The moisture and carbohydrate content of specimens are significantly ($p > 0.05$) lower in samples collected from Abeokuta, Remo and Ijebu respectively. The moisture content reported in this study is significantly higher compared to the values reported for *Robo* by [4] and *Aadun* by [3]. This implies that the snacks will have good shelf life and its consumption will not lead to any sudden surge in blood glucose level of the consumers.

CONCLUSION: This study concludes that highest proximate values for locally vended snacks were found in

Abeokuta followed by Remo and Ijebu area respectively.

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Assessment Of The Glycemic Index Of Meal From Unripe Plantain (*Musa Paradisiaca*)

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KEYWORDS: Assessment, Glycemic Index, Unripe Plantain.

BACKGROUND:

Plantain, usually consumed as a cheap source of energy in many parts of African countries (1) has been identified to have therapeutic importance for its low glycemic index properties (2). Plantains, an important food and cash crop grown in more than 120 countries of the world (3) is ranked third after yam and cassava, and has been found to contribute significantly to food and nutritional security through income diversification and poverty reduction (4)

OBJECTIVE: The study assessed the glycemic index of meals from unripe plantain

MATERIALS AND METHOD: The unripe plantain was purchased from Osiele markets, Abeokuta. Ten (10) apparently healthy volunteers aged 21-25 with normal BMI were served 350g of the meal to give 50g available carbohydrates and 50g glucose as the reference sample. The meal was served plain after 11-12 hours overnight fast, and blood glucose was tested at a specified time interval. The incremental area under the curve (IAUC) was determined using Microsoft Excel, and the GI was calculated. Statistical Package for Social Sciences (SPSS) version 25.0 was used to calculate the mean and standard deviation.

RESULTS AND DISCUSSION: The mean proximate values from the duplicate readings were moisture (68.99%), crude protein (4.0g), crude fat (1.81g), total ash (1.55g), total carbohydrate (23.11g) and total dietary fiber (8.79g). The mean incremental area under the curve for the sample was 7791.85 ± 513.3 mg/dl, and glucose was 14022 ± 1725.5 mg/dl. The glycemic index and glycemic load values of the meal were 56.36 ± 8.4 and 8.07, respectively. Previous research on glycemic index of plantain (2,5) revealed the glycemic index of plantain dough as 42.95 (2) and boiled plantain as 64.94 (5), thus revealing that the processing method influences the glycemic loads of food.

CONCLUSION AND RECOMMENDATION:

The result of this study revealed that unripe plantain has a moderately low glycemic index and load; Thus, it can be indicated for therapeutic purposes. However, there is a need for further research on the effects of processing methods on glycemic index and load of unripe plantain.

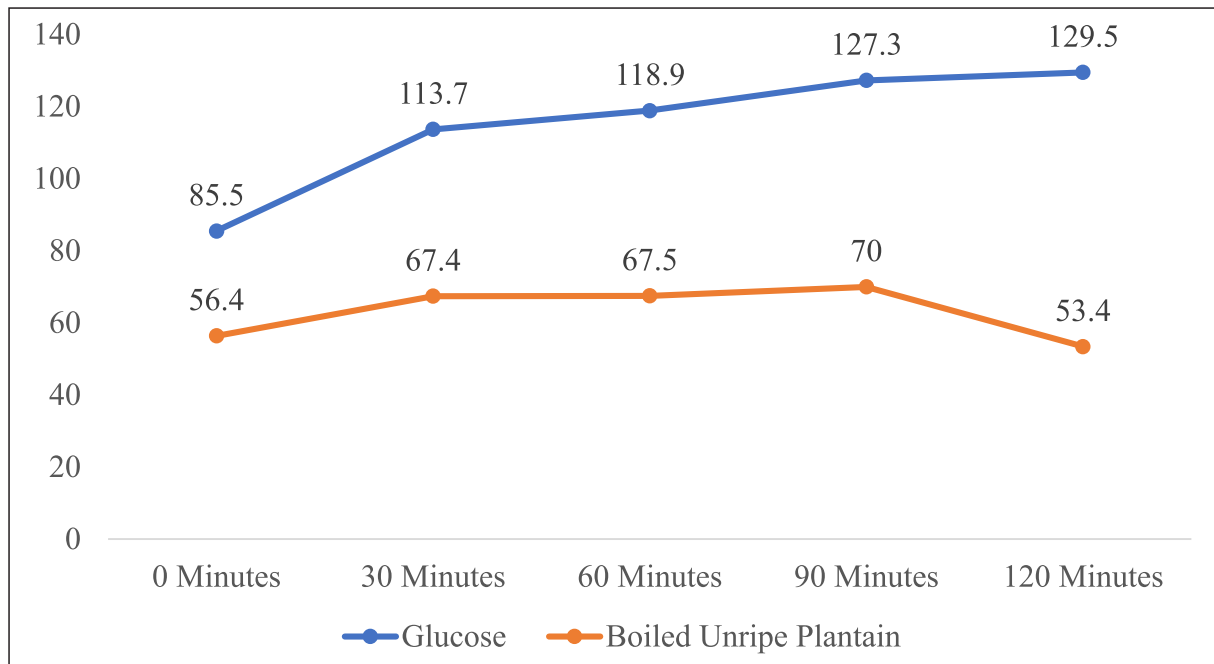


Figure 1: Change In Blood Glucose Level Of Subjects To Experimental Food

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Methods of Fruit Ripening: Effect on the Nutrients Content

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KEYWORDS: Nutrients content, Ripening, Fruit, Effect.

BACKGROUND:

Fruit is a natural staple food consumed by humans [1]. They contain a high amount of chemically active compounds, essential nutrients, and antioxidants in a good proportion which function as disease prevention including atherosclerosis, heart and brain disorders, or different types of cancer and keep a person active and energetic throughout the lifetime [2,3]. The anti-nutritional properties reduce the nutrient utilization in plants or plant products which is an important determinant in the use of plants for humans and animals consumption [4]. Fruits contain micro nutrients that are required small amount for functioning of the body system, the nutrients are to be preserved to achieve purpose of consuming it.

OBJECTIVE: The study assessed different methods of fruit ripening and their effect on fruit wholesomeness

METHODOLOGY: Wholesome fruits of four different types were purchased at Gbongan market central market for fruits and other commodities. Each variety was subjected to different kinds of ripening methods such as calcium carbide treatment, blanching, ethylene bag, and natural ripening. The pulp was extracted after-ripening for biochemical analysis and organoleptic evaluation was carried out using hedonic scale method [5]. Data were analyzed using a one-way ANOVA followed by a post hoc test. The results revealed that the selected fruits could be artificially ripened by calcium carbide and it was more effective in early ripening when compared to natural ripening.

RESULTS: Phylate content of banana is higher (16.45) in calcium carbide than that of other methods, in total carotene, banana ripens with calcium carbide has the highest figure (408.05) followed by banana ripens with natural ripening (387.55), orange is very high (296.76) in calcium carbide, Cu (mg) (1.14, 1.08), and Zn (Mg) (2.41, 2.45), high with calcium carbide and polythene. The level of Phosphorus pear is high in calcium carbide and polythene (472.54, 378.15), also Mg(mg) very high in banana the amount in ripening with Calcium carbide (285.07), polythene (278.93), Blanching (261.17), and natural (261.17) compared with other fruits. Sensory evaluation reviewed that there are significant analyze in texture, appearance, odour, colour, the taste of banana.

CONCLUSION AND RECOMMENDATION:

In conclusion, the natural method of ripening is more significant and safer for human consumption than every other method in terms of sensory and nutrient content. People should take a close of whatever they want to buy by hand filling, touch,etc most especially fruits because different methods are used for fruits

ripening and it usually reflect on the appearance (e.g black patches) .

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OD10

Evaluation of some selected Properties of Sprouted yellow maize, Lentils and Aiden composite flour as a Functional Ingredient in Snacks

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KEYWORDS: Sprouted yellow maize, Lentils, Aiden fruit, Composite flour

BACKGROUND AND OBJECTIVE:

Composite flour has been defined as a mixture of several flours obtained from roots, tubers, cereals and legumes with or without the addition of wheat flours [1] and it is considered advantageous in developing countries as it reduces the importation of wheat flours and encourages the use of locally grown crops as flours [2] Sprouting/germination is used in processing of cereals to improve its nutritional quality as it results in reduction of anti-nutritional factors [3]. Yellow maize is a pro-vitamin A fortified maize that has the potential of addressing vitamin a deficiency which is an issue of great public health concern in Africa [4]. Lentils (*Lens culinaris*) is an edible legume which is rich in protein, high in fibre and low in fat. Aiden fruit (*Tetrapleura tetraptera*) has been used as herbs in household spice because of its nutrient composition and aroma. Hence, the objective of this study is to evaluate the proximate, mineral and functional properties of sprouted yellow maize (SYM), Lentils and aiden composite flour.

MATERIALS AND METHOD: The yellow maize and the aiden fruit was obtained from kuto market Abeokuta, Ogun state while the lentils was ordered from an online store. Slightly modified method of Oluwafemi et al. [5] was used to obtain sprouted yellow maize flour. Lentils flour and aiden flour were obtained using relevant standard procedures. D-optimal mixture design used to obtain various mixture ratio of the three components of the composite flour (sprouted yellow maize-lentils-aiden). The mixture generated ten experimental runs with the value of the sprouted yellow maize ranging from 50-70%, lentils 30-50 % and Aiden 0-15%. The combinations were analysed for proximate, functional properties and vitamin composition using standard laboratory procedures⁽⁶⁾.

RESULTS AND DISCUSSION: The mean value of the moisture, protein, fat, ash, crude fibre and carbohydrate contents of the samples ranged from 7.07% to 8.09%, 11.0% to 28.1%, 8.92% to 17.37%, 1.00% to 1.66%, 0.49% to 2.95%, and 57.03% to 63.30%, respectively. It was observed that moisture content increased with an increase in Aiden content, this is in line with the value 7.37%-10.64% reported by⁽⁷⁾ the moisture content of the sample increased with an increase in lentils content and this corresponds with the value of 8.26%–9.65% reported by⁽⁸⁾ or an average lentils seed. Linear mixtures between sprouted yellow maize and lentils had a positive effect on one another while the linear mixture between sprouted yellow maize, Aiden and Lentils, Aiden had a negative relationship on one another. i.e the inclusion of one reduced the protein content of the other. The mean value of calcium, magnesium, potassium, sodium, iron, zinc contents of the samples ranged from 0.113% to 0.27%, 0.122% to 0.295%, 0.305% to 0.921%, 0.131% - 0.247%, 21.24mg/kg to 98.81 mg/kg, respectively. An increase in maize content of the formulation led to a corresponding decrease in the calcium content, increase in lentils content led to a corresponding increase in calcium content and an increase in Aiden content led to a corresponding increase in calcium content of the formulation. This indicated that the calcium content in Aiden is more than that of maize and lentils. The phosphorus content of Aiden fruit was slightly higher to the 0.303% reported by⁽⁹⁾. An increase in sprouted yellow maize, lentils and aiden also led to a corresponding increase in phosphorus.

Table 1: Coefficients of regression in terms of the responses and fit statistics

Parameters	CHO	Crude Protein	Moisture	Crude Fat	Crude Ash	Crude Fibre
A	62.37	12.63	7.47	15.16	1.03	1.42
B	59.65	16.08	7.07	16.43	1.32	0.63
C	69.60	5.54	7.38	10.41	1.71	2.28
AB	*21.63	*44.10	1.60	* -22.56	*1.77	*-2.61
AC	*-22.25	*6.46	0.70	* 3.94	-0.47	* 0.77
BC	*-21.76	*45.08	* 2.94	* 6.14	-0.41	*1.83
R ²	0.578	0.7227	0.9102	0.3339	0.8325	0.6641
Std.Dev	3.09	4.99	0.14	4.30	0.14	0.70
Mean	61.65	16.36	7.55	14.14	1.33	1.41
C.V	5.01	30.54	1.87	30.38	10.16	50.11
PRESS	431.33	1429.84	1.16	832.08	0.85	20.79

A,B and C Germinated yellow maize, Lentil and Aiden fruit AB, AC and BC interaction effect sprouted yellow maize and lentil, interaction effect of germinated yellow maize and Aiden fruit, and interaction effect of lentils and Aiden fruit.

CONCLUSION AND RECOMMENDATION: Significant ($p < 0.05$) differences were observed in most of the properties evaluated. Inclusion of lentils and Aiden fruit had a positive correlation on the moisture content of the formulations and inclusion of sprouted yellow maize and lentils, sprouted yellow maize and Aiden and lentils and Aiden had a positive correlation on the protein content, this signifies that the blends of the three flour improved the protein content of the flour. The model for the magnesium content was significant ($p < 0.05$), this indicated that the model is a good predictor of the magnesium content of the sample and a high R^2 obtained justifies that the variable is highly fitted to the regression equation.

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Proximate composition, Antinutritional factors, minerals analyses and Invitro antioxidant potentials of Orange fleshed sweet potato (OFSP) leaves

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KEYWORDS: Orange Flesh Sweet Potato Leaves

BACKGROUND:

Leafy vegetables are major sources of vitamins, dietary fibre, essential amino acids and antioxidants. These vegetables can reduce the incidences of malnutrition and stunting among vulnerable groups (women and children) in Nigeria; which can lead to deficiency diseases capable of increasing morbidity and mortality rates. More than Two billion people who live in low income Countries are affected globally by 'hidden hunger' particularly due to the deficiency of vitamin A, iodine, iron and zinc. Recently, the orange-fleshed sweet potato (OFSP) roots and leaves has been attracting food technologists and Nutritionists because it is a naturally bio fortified root crop which can be useful in combating nutrient deficiency diseases. This present study aim to evaluate the proximate, minerals, antinutrients and invitro antioxidant potentials of OFSP leaves. The present study also aims at solving the arguments of how possible it is for low income earners to eat quality meal and how useful is OFSP leaves in addressing food security. The present study seeks to analyse the proximate, minerals, antinutrients and invitro antioxidant potentials of OFSP leaves and compare the results with fluted pumpkin leaves which have been proven to be good source of major nutrients.

MATERIALS AND METHODS: The fresh leaves of Orange fleshed sweet potato (*Ipomoea batatas*) were purchased from Michael Okpara University of Agriculture farm, Nigeria. The plant was identified by the Department of Plant Biology and Biotechnology, University of Benin and authenticated in the same department. A voucher specimen number, UBH-I493 was deposited at the Herbarium of Department of Plant Biology and Biotechnology, University of Benin.

The OFSP leaves were washed to remove impurities and chopped into small pieces and air dried under shade to a constant weight. The dried samples were ground to powder, passed through a 0.5mm mesh and kept at 4°C and stored protected from light, oxygen and heat.

The dried samples were extracted with water and methanol to obtain aqueous and methanolic extract. The crude samples were screened for phytochemicals, and analysis for proximate constituents were carried out using the standard methods of Association of Official Analytical Chemists. Minerals and invitro antioxidant properties were also analysed using standard methods on aqueous and methanolic extract of the samples.

RESULTS AND DISCUSSIONS: The dried OFSP leaves showed promising antioxidant activities with significantly higher $P \geq 0.05$ total phenolic and flavonoid content; which was measured as DPPH and ABTS value. The protein, fiber and ash (magnesium, potassium, calcium, iron, selenium and zinc) of the OFSP leaves were also significantly higher $P \geq 0.05$ in comparison to 'pumpkin leaves' a commonly used green leafy vegetable.

Table 1: Proximate composition and ant nutritional factors of orange fleshed sweet potato leaves compared to fluted pumpkin

Parameters	Pumpkin 1	Pumpkin 2	OFSP Sample 1	OFSP Sample 2
Moisture (g/100 g)	12.13±0.55 ^a	11.69±0.27 ^b	12.40±0.19 ^c	11.25±0.34 ^a
Protein (g/100 g)	3.29±0.40 ^c	3.33±0.12 ^c	5.65±0.05 ^b	5.84±0.07 ^a
Fat (g/100 g)	0.56±0.03 ^b	0.41±0.05 ^b	0.70±0.01 ^a	0.63±0.03 ^a
Ash (g/100 g)	2.89±0.01 ^b	2.97±0.01 ^b	3.32±0.06 ^a	3.39±0.01 ^a
Crude fiber (g/100g)	2.36±0.11 ^b	2.25±0.07 ^b	2.68±0.10 ^a	2.51±0.13 ^a
Insoluble dietary fiber (g/100 g)	2.41±0.01 ^b	2.72±0.01 ^a	2.31±0.01 ^b	2.17±0.01 ^c
Soluble dietary fiber (g/100 g)	1.97±0.01 ^a	1.69±0.02 ^c	1.86±0.04 ^b	1.88±0.01 ^b
Total dietary fiber (g/100 g)	4.38±0.03 ^a	4.41±0.05 ^a	4.17±0.01 ^b	4.05±0.01 ^b
Zinc (mg/100g)	2.86±0.01 ^b	2.54±0.03 ^b	3.67±0.07 ^a	3.85±0.11 ^a
Antinutritional factors				
Phytic acid (mg/100g)	0.03±0.00 ^a	0.02±0.01 ^a	0.01±0.00 ^a	0.01±0.01 ^a
Tannins (mg/100g)	0.18±0.04 ^a	0.15±0.03 ^a	0.13±0.01 ^a	0.11±0.01 ^a

Mean± standard deviation of triplicates

Means with no common letters within a row significantly differ ($p \leq 0.05$). All values are on dry weight basis

CONCLUSION AND RECOMMENDATION:

This study shows that the dried leaves of OFSP is a functional food and is a good source of proteins, minerals (especially zinc) and antioxidants. The leaves can be used to alleviate the problems of seasonal food insecurity, malnutrition and stunting in Nigeria.

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Metabolic Energies of some Selected Snacks from South-Western Nigeria

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KEYWORDS: Fast Foods, Albino Rats, Fecal Energy, Urinary Energy.

BACKGROUND:

Knowledge of metabolizable energy (ME) and Digestible energy (DE) of any food is an essential tool in weight loss/gain program. This study was conducted to determine the value of spent and unspent energy of some randomly franchised fast foods (FF) using albino rats.

MATERIALS AND METHOD: Seventy-eight albino rats were fed ten FF using a randomized block experiment. Feces and urine from each rat were collected daily in triplicate and analyzed for DE and ME using standard laboratory procedures. The animals were sacrificed after an overnight fast and some internal organs were weighed. Data were analyzed using descriptive statistics, analysis of variance and Pearson Product Moment Correlation (PPMC).

RESULTS AND DISCUSSION: Daily energy intake of rats ranged from 58.5 to 124.54 kcal. ME and DE value ranged from 9.03 to 44.44 kcal and 11.22 to 45.28 kcal respectively. ME was significantly higher ($P \leq 0.05$) in non-meat-based than meat-based fed groups. Abdominal white fat and liver weight ranged from 4.69 to 8.41 g and 4.54 to 7.92 g respectively. Average weekly weight gain of rat models ranged from 8.68 to 11.93 g. A significant correlation was observed between liver weight and zinc intake ($r = 0.433$; $P \leq 0.05$) in PPMC for liver weight of rat models. The concentration of metabolizable and digestible energy were greater in nonmeat based fed group $P < 0.05$ when compared to the meat based fed group, but when compared with the control group; the meat based fed group had higher values except sample B40S where there was no significant difference $P > 0.05$ with reference group (Baer *et al.*, 1997; Garcia, 2003).

The average weight gains during the metabolic periods as shown in the study, revealed a peak in C30R-fed group. At the beginning of the metabolic periods, there appeared to be no significant difference between all groups, but at the end of the 6 metabolic periods, there were significant difference across all groups with the control and reference group having the least total weight but with no significant difference. Animals in the FF groups continued to gain weight and were heavier than control animals throughout the study period.

CONCLUSION AND RECOMMENDATION

This study revealed that the more protein and salts in the diet, the less the unspent energy derived from the diets; however, feeds with higher unspent energy tends to increase organ weights and thereby a risk factor to increased pathogenesis of diseases and mortality in rats. Fast food centers operators can be encouraged to reduce the serving size of popcorn in order to reduce total caloric intake.

Table 1 : Metabolizable and digestible energy of feeds

Rats fed diet	Urinary energy (kcal)	Faecal energy (kcal)	GE (kcal)	ME (kcal/g)	DE (kcal/g)	Net energy (kcal)	Av intake daily (Kcal)
B30S	NMB 1.00 ^c ±0.20	84.16 ^e ±0.37	115.66 ^b ±2.00	3.05 ^{bc} ±1.54	3.15 ^{bc} ±1.63	62.28 ^b ±2.00	113.84 ^b ±0.49
C30R	NMB 0.90 ^c ±0.08	82.46 ^{cb} ±0.90	114.95 ^b ±3.07	3.16 ^b ±1.82	3.25 ^b ±2.41	61.57 ^b ±3.07	113.67 ^b ±0.76
S30T	NMB 0.52 ^{cd} ±0.03	83.63 ^a ±6.12	111.69 ^b ±0.51	2.75 ^{bcd} ±6.60	2.81 ^{bcd} ±6.55	58.30 ^b ±0.51	109.45 ^b ±0.20
S60T	NMB 0.83 ^c ±0.62	79.01 ^b ±3.80	124.54 ^a ±2.57	4.44 ^a ±5.34	4.53 ^a ±5.81	71.17 ^a ±2.59	114.18 ^a ±0.58
T30R	NMB 0.52 ^{cd} ±0.04	76.90 ±0.82	116.28 ^b ±0.86	3.90 ^a ±1.16	3.95 ^a ±1.19	62.90 ^b ±0.86	113.56 ^b ±0.19
B40S	MB 2.22 ^a ±0.02	68.29 ^f ±0.91	79.55 ^d ±0.51	0.90 ^g ±1.19	1.12 ^f ±1.24	26.17 ^d ±0.51	76.88 ^{cd} ±0.19
T20R	MB 1.70 ^b ±0.03	74.06 ±0.65	99.33 ^c ±0.55	2.36 ^{def} ±0.90	2.53 ^{bcd} ±0.92	45.95 ^c ±0.55	97.66 ^{bc} ±0.15
S20T	MB 1.70 ^b ±0.05	71.18 ^{ef} ±0.76	100.35 ^c ±1.04	2.75 ^{bcd} ±1.24	2.92 ^{bcd} ±1.21	46.97 ^c ±1.04	98.86 ^{bc} ±0.29
C50R	MB 1.48 ^b ±0.13	36.14 ⁱ ±0.22	58.55 ^f ±1.70	2.09 ^{ef} ±2.05	2.24 ^{de} ±1.92	5.16 ^f ±1.70	56.66 ^e ±0.80
T10R	MB 1.70 ±0.04	44.07 ^h ±0.58	63.99 ^e ±2.74	1.82 ⁱ ±2.13	1.99 ^e ±2.17	10.61 ^e ±2.74	62.99 ^d ±1.20
Control	NMB 0.05 ^d ±0.02	21.25 ⁱ ±0.46	45.92 ^a ±9.78	2.43 ^{cd} ±0.96	2.44 ^{cd} ±0.96	-7.46 ^g ±5.77	4.49 ^e ±0.18
Reference	MB 2.22 ^a ±0.04	49.27 ^a ±0.77	54.60 ^f ±0.55	0.31 ^g ±0.12	0.53 ^f ±0.12	1.22 ⁱ ±0.55	48.76 ^{ef} ±0.76
Baseline	NMB 0.63 ^a ±0.03	21.29 ⁱ ±0.47	3.38 ^f ±2.32	3.14 ^{bc} ±0.19	3.15 ^{bc} ±0.19	NA	

^{abcd}^{efghi} Means along the serial column with different superscripts have significant difference (p<0.05)

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OD13

Development Of Nutrient-Dense Breakfast Food From Blends Of Acha, African Yam Bean And Tigernut

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KEYWORDS: Acha, African yam bean, Tigernut, Nutrient-dense

BACKGROUND:

There is a global challenge in balancing the nutritional value of most staple food, especially in developing countries including Nigeria (1). This has posed a serious health challenge to individuals due to the high intake of energy-giving food and low intake of protein caused by the high cost of animal protein food sources such as milk, eggs, meat, and fish. For instance, most of the conventional foods produced in developing countries are high in carbohydrates and have contributed to a high rate of malnutrition in children and the development of non-communicable diseases such as diabetes in adults. Hence, there is a need to fortify locally available foods that are deficient in proteins and micronutrients. Africa yam bean is being used in developed countries to fortify and enrich food due to its high protein content (2). While tiger nut, apart from its rich nutrients' composition, is packed with antioxidants which are beneficial compounds that protect the body against aging and diseases like cancer and heart disease (3). This study, therefore, aimed to develop a nutrient-dense food from blends of acha, African yam bean and tigernut.

MATERIALS AND METHOD:

Acha, African yam bean and tigernut were procured locally. The grains were cleaned, washed, dry milled, and sieved to produce flour. Acha, African yam bean and tigernut flour were mixed in ratios 100:0:0, 90:5:5, 80:10:10, 70:15:15, 60:20:20 to produce breakfast food. The products were analyzed for proximate composition, chemical and functional properties, anti-nutritional factors and microbial properties. Sensory attributes of the products were also evaluated. The data obtained were subjected to analysis of variance (ANOVA) and means separated using the new Duncan multiple range test.

RESULTS AND DISCUSSION:

The proximate composition of flour ranged from 3.50 to 7.73%; 5.91 to 9.54%; 0.73 to 3.00%; 1.03 to 1.73%; 0.62 to 1.01%; 76.97 to 88.19% for moisture, protein, fat, ash, crude fibre and carbohydrate respectively. The functional properties ranged from 93.67 to 119.00 ml/g; 8.43 to 9.25%; 93.67 to 105.00 ml/g, 0.67 to 0.89 ml/g for water absorption capacity, swelling capacity, oil absorption capacity and bulk density, respectively. The mineral composition ranged from 21.37 to 154.99 mg/100 g; 5.11 to 14.22 mg/100 g and 28.85 to 195.96 mg/100 g for potassium, iron, and magnesium, respectively. The vitamin composition of flour ranged from 0.21 to 0.40 µg/100 g; 0.27 to 0.28 mg/100 g; 0.05 to 0.19 µg/100 g for vitamin A, vitamin B₁, vitamin B₃ respectively. The anti-nutrient composition of flour ranged from 0.08 to 0.18 mg/g; 0.08 to 0.4 mg/g; 0.41 to 0.72 mg/g for phytate, tannin and saponin, respectively and are within safe levels. Sensory evaluation panelists preferred the product formulated with 100% acha flour and 90:5:5 acha-African yam bean-tiger nut flour.

CONCLUSION AND RECOMMENDATION

In conclusion, the results obtained indicated that the breakfast meal from acha can be nutritionally enhanced with the addition of African yam bean and tiger nut flour. The blend made from a ratio of 90:5:5 of acha, African yam bean and tiger nut flour was highly preferable during sensory evaluation. The intake of this product could contribute to the reduction of malnutrition, especially, protein-energy and micronutrient malnutrition.

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Dietary Pattern and Prevalence of Overweight and Obesity among Undergraduates of Federal University of Agriculture, Abeokuta.

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KEYWORDS: Dietary pattern, Prevalence, Overweight & Obesity, Undergraduates

BACKGROUND:

Overweight and obesity is a growing public health problem, and in addition, the compromised quality of life and reduced life expectancy arising from it is related to coronary heart disease, stroke, asthma, and several cancers [1]. Dietary and lifestyle factors are linked to burden of overweight and obesity, poor feeding habits, such as skipping meals, low intake of fruits and vegetables, milk, fish and high intake of [fast food](#), sweets, and sugar-sweetened beverages are present in diets of Undergraduate [2]. Generally young adults are often presumed healthy and therefore rarely the subjects of obesity research, if left unchecked, will constitute future risks for associated non-communicable diseases among undergraduates [3]. Hence, this study assessed the dietary pattern and prevalence of overweight and obesity among undergraduates of Federal University of Agriculture, Abeokuta.

MATERIALS AND METHOD:

The study was cross-sectional and descriptive in design conducted at Federal University of Agriculture, Abeokuta (FUNAAB) located along Alabata Road in North Eastern part of the town, Odeda Local Government Area of Ogun State. The participants were 300 full-time Undergraduates of FUNAAB. The research used multi-stage sampling technique approach. The Students database was the sampling frame sourced from I.C.T Department. The researcher grouped the Colleges with respect to program similarities into 5 groups. One college each was drawn from the 5 groups to give 5 colleges. Respondents were picked from 5 Colleges proportionately.

The study used structured questionnaire to collect data on Socio-economic and Socio-demographic Characteristics of Respondents, Physical Activity Level, Factors Contributing to Obesity, Dietary Intake, Dietary Pattern, and Assessment of Nutritional Status using Anthropometry. Permission was obtained from the Department of Nutrition and Dietetics, Consent was sought from respondents and those who didn't give consent were excluded. The data from questionnaires collected were coded, analyzed using SPSS V20.0 (windows). Frequency distribution, mean and percentages were computed. Data from 24hour dietary recall was analyzed with Nutri-Survey (windows). Result was presented using tables, texts and charts.

RESULTS AND DISCUSSION:

Respondents were between ages 16-29 years with mean and standard deviation height, weight and BMI as 1.69 ± 0.08 , 64.82 ± 10.29 and 22.62 ± 3.48 respectively. 18.3% and 2.9% were overweight and obese respectively. 60.7% engaged in high physical activities. 25.6%, 10.7%, 63.7% had inadequate, adequate and excess calorie intake relative to RDA. Cumulative most consumed foods were pasta, sugar, biscuits, garri, with low intake of fruits, legumes.

The study found out that about two third of the respondents had excess intake of energy, similar to the

findings of [4] among university students. The result of the prevalence of overweight and obesity in this study is consistent with a study done by [5] among undergraduates in Ogun state. If overweight and obesity among undergraduates in Nigeria remains unchecked, there is possibility of prevalence increase.

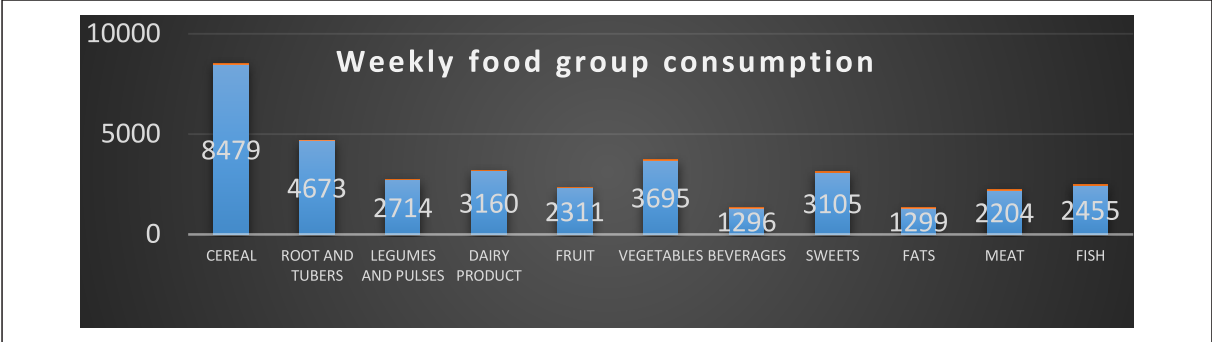


Table 1: Anthropometric Indices of the respondent(N=300)

Categories	Frequency (F)	Percentage (%)
BMI (kg/m²)		
Underweight	29	9.7
Normal weight	207	69.0
Overweight	55	18.3
Obese I, II and III	9	2.9
Waist to Hip Ratio		
No abdominal obesity	222	74.0
Abdominal obesity	78	26.0

CONCLUSION AND RECOMMENDATIONS:

Respondents' frequent consumption of high energy foods contributed to high prevalence of overweight and obesity. The school can provide accessibility to healthy nutritious diets and incorporate nutrition education to sensitize undergraduates about healthy dietary practices.

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OD15

Fatty Acid Profile and Cholesterol Contents of Selected Indigenous Foods Consumed in Rural Communities of Southwest Nigeria

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KEYWORDS: Indigenous foods, fatty acid profiles, cholesterol Contents and southwest Nigeria.

BACKGROUND:

Intake of Dietary fatty acids and cholesterol play an important role in the etiology of cardiovascular disease (CVD). High saturated fatty acids (SFA) intakes have been associated with increased CVD and type-2 diabetes (T2D) risk (1). The prevalence of obesity has risen in recent years, and WHO estimated that 39% of adults are overweight, of which 13% are obese (2). Knowledge of the composition of these nutrients in food is therefore essential for proper planning of health programs. The study was carried out to assess the fatty acid profile, fatty acid quality, and cholesterol composition of commonly consumed indigenous foods in southwest states of Nigeria.

MATERIALS AND METHOD: Samples of indigenous foods were selected among rural communities of southwest Nigeria. Data on the ingredients, their quantities, and cooking method of the food were collected. Total fat content in g/100 g dry weight matter of food was determined gravimetrically following the method of (3). Fatty acid profile was determined by gas chromatography-flame ionization detector into: Saturated, Monounsaturated, Polyunsaturated. Nutritional quality was calculated using fatty acid ratio, polyunsaturated fatty acid/ saturated fatty acid ratio. Cholesterol was determined by gas chromatography. Each food sample was analyzed accordingly.

RESULTS AND DISCUSSION: Total fatty acids (TFA) ranged from 7.2 - 14.69g/100g edible portion (EP) of food, saturated fatty acid levels ranged from 31.35 and 74.14% of TFA (Table 1). Monounsaturated fatty acids (MUFA) 20.51-44.81% of TFA and polyunsaturated Fatty acids (PUFA) ranged from 1.58 - 5.02% of TFA (Table 2). The Cholesterol content was low in all foods samples. Results showed that the selected foods

had better nutritional quality in terms of the fatty acids content, as indicated by the polyunsaturated fatty acid/saturated fatty acid ratios. The total saturated fatty acid (SFA) in all the samples were significantly higher than poly unsaturated fatty acid (PUFA), this may be due to the fact that most of the foods had crude palm oil as their constituents.

Table 1: Total Fat and Saturated Fatty Acids and Cholesterol content of the selected foods consumed in rural communities of Southwest Nigeria per 100g

Food Sample	Total (g) EP	Fat	Saturated Fatty Acids						ΣSFA	Cholesterol (Mg)
			8:0	12:0	15:0	16:0	17:0	18:0		
<i>Ila-asepo</i>	7.2	19.43	45.09		9.71				74.14	0.001d±0.00
<i>Efo-riro</i>	9.36		20.77	49.31	1.20		6.63		71.28	0.002b±0.01
<i>Gbure-elegusi</i>	14.08		0.90	22.52	4.32	0.64	2.97		31.35	0.0013a±0.04
<i>Sapala</i>	7.49		34.50		2.75		2.93		40.17	0.001d±0.00
<i>Ojojo</i>	14.69		32.79	0.81	2.72	2.74	15.74	1.18	56.0	0.002b±0.01

Table 2: Fatty acid profile on the wet weight of the edible portion (percentage of the total fatty acids) commonly consumed indigenous foods in southwest State, Nigeria

Foods sample	Monounsaturated Fatty Acid				Polyunsaturated Fatty Acids					
	16:1	18:1	20:1	ΣMUFA	18:2	18:3	20:5	22:6	ΣPUFA	ΣPUFA/ΣSFA
<i>Ila-asepo</i>	8.14	17.73		25.86						0.24
<i>Efo-riro</i>	15.39	5.12		20.51	0.74	0.84			1.58	0.02
<i>Gbure-elegusi</i>	27.18	24.68	2.24	54.10	12.94	1.62			14.55	0.46
<i>Sapala</i>	23.81	21.00		44.81	3.34		10.38	1.31	15.02	0.37
<i>Ojojo</i>	6.13	32.87		39.01	5.02				5.02	0.09

CONCLUSION AND RECOMMENDATIONS: This study showed a high percentage of unsaturated fatty acids, the nutritional indices of PUFA/SFA is since the foods are not being consumed alone. The cholesterol content was low. Food samples with low fatty acid quality based on their PUFA/SFA values; should be consumed in moderation and promote dietary diversification so that the meal can contain all the nutrients the body needs in the right quantity and quality.

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Proximate composition and sensory characteristics of gluten-free finger millet-soya bean snacks

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KEYWORDS: Finger-Millet, Gluten-Free, Snacks, Proximate Composition.

BACKGROUND:

Development of food products using composite flour will improve the consumption of nutrient-dense but underutilized grains such as finger millet. Finger millet, a cereal, and soya bean, a cheap source of plant protein, [1,2] are ideal grains for production of gluten-free snacks. Cakes and chin-chin are major snacks highly cherished by different age groups and are necessary food products offered to guests in birthdays, weddings and several social events. Hence, the objective of this study was to determine the proximate composition and sensory properties of gluten-free finger millet-soya bean cakes and chin-chin.

MATERIALS AND METHODS

Dry cleaned finger-millet and dehulled soybean seeds were separately milled to fine flour. A blending ratio of 90:10 was used to formulate a finger millet-soya bean blend for production of gluten-free finger millet-soyabean cake (FSC) and finger millet-soyabean chin-chin (FSCC). While 100% wheat flour served as controls for cake (WHC) and chin-chin (WHCC). Proximate composition and sensory characteristics were determined. Data were analyzed using statistical packages for social sciences (SPSS) version 20.0.

RESULTS AND DISCUSSION: Table 1 shows the proximate composition of cake and chin-chin samples produced from finger millet-soybean blends and 100% wheat flour. For cake samples, FSC have a lower moisture and; between chin-chin samples, FSCC (13.4%) have a higher moisture content. Some authors have reported higher moisture content in cakes produced from 100% finger millet flour (16.35%) [4] and wheat-finger millet blends (36.26%). Moisture is required for cake to maintain its quality, and excessive moisture has a negative impact on stability of confectionaries [3].

The cakes and chin-chin have favorable proportions of protein, ash, fat, fiber and carbohydrate. Table 2 shows the sensory characteristics of cake and chin-chin samples produced from finger millet-soybean flour blends and 100% wheat flour. The mean scores for each of the organoleptic parameters are high, an indication of consumer acceptability of the samples of cakes and chin-chin. Low mean scores on overall acceptability have been reported in some studies [1,4].

CONCLUSION AND RECOMMENDATION(S):

Gluten-free finger millet-soybean cakes and chin-chin have more fiber, less carbohydrate and appreciable consumer acceptability. This study recommends finger millet-soya bean blend for the production of healthy snacks as an alternative to wheat flour for all consumers especially for the management of celiac disease.

Table 1: Proximate composition of finger millet-soybean/ 100%wheat cakes and chin-chin

Parameters	Samples			
	WHC (100%)	FSC (90:10)	WHCC (100%)	FSCC (90:10)
Moisture	21.45±0.05	18.09±0.03	7.26±0.16	13.4±0.10
Protein	8.09±0.06	7.63±0.07	11.09±0.03	9.42±0.09
Fat	33.68±0.32	38.81±0.60	25.92±0.49	25.09±0.10
Ash	2.58±0.02	2.23±0.07	1.78±0.04	2.58±0.03
Fibre	1.33±0.08	1.59±0.13	1.27±0.03	2.81±0.21
Carbohydrate	32.88±0.39	31.67±0.45	52.68±0.69	46.71±0.16

Table 2: Sensory characteristics of finger millet-soybean / 100% wheat cakes and chin-chin

Parameters	Samples			
	WHC	FSC	WHCC	FSCC
Taste	8.60 ± 0.68	7.70 ± 1.149	8.00 ± 0.97	7.40 ± 1.60
Texture	7.84 ± 1.18	7.55 ± 1.05	8.00 ± 0.97	7.65 ± 2.43
Color	8.00 ± 0.97	7.20 ± 1.93	7.80 ± 0.95	5.80 ± 2.35
Appearance	8.00 ± 0.97	7.05 ± 1.76	7.85 ± 1.38	6.20 ± 2.14
Overall acceptability	8.50 ± 0.68	7.75 ± 0.91	7.50 ± 2.18	7.00 ± 1.48

Keys: WHC (control) = 100% wheat cake; FSC= 90:10 finger millet-soybean cake; WHCC (control) =100% wheat chin-chin; FSCC=90:10 finger millet-soybean chin-chin.

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Evaluation of Phytochemical and Anti-nutrient Compositions of Yoghurt Produced from Bambara nut (*Vigna subterranean*) and Tiger nut (*Cyperus esculentus*)

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KEYWORDS: phytochemical, Antinutrient yoghurt

Introduction

Tiger nut is a good non-dairy substitute for the production of yogurt especially for people who suffer from lactose intolerance, considering the enormous health benefits offered by its probiotic effects [1]. Murevanhema [2] evaluated the optimal conditions of fermentation of bambara groundnut milk using lactic acid bacteria. Falade et al. [3] recently reported the production of bambara groundnut yoghurt using starter cultures of *Lactobacillus delbrueckii subsp. bulgaricus* and *Streptococcus salivarius subsp. thermophiles*. The study was designed to produce and determine the phytochemical and anti-nutrient compositions of yoghurt from bambara nut and tiger nut.

Materials and Methods

The tiger and bambara nuts, powdered milk, and starter culture were all obtained from Cemetery Market Aba, Abia State, Nigeria. Bambara nut was sorted, washed, drained, and soaked for 24 hrs. the skin was removed, roasted, milled and strained to obtain the milk. Tiger nut was sorted, washed, drained, soaked for 24hr, washed with warm water, milled, and strained to obtain milk. The micronutrient composition of samples was analyzed in triplicates using AOAC methods [4]. Data were analyzed in triplicates in replicates one-way ANOVA at $p < 0.05$ level of significance [5].

Results and Discussion

Anti-Nutrient Composition (ppm) of Yoghurt Produced from Bambara Nut and Tiger nut

The result in Table 1 shows the anti-nutrient composition of the yoghurt processed from Bambara nut and Tiger nut yoghurt. The phytate content ranged from 9.36ppm to 15.94ppm and it was discovered that yoghurt from Bambara nut had the highest phytate content (15.94ppm), while that of tiger nut had the least 9.36ppm. The tannin content of samples ranged from 1.52 to 1.92ppm and sample YC (1.52 ppm) was rated lowest, while sample YB (1.92 ppm) had the highest value. The oxalic content ranged from 0.72- 8.23 ppm, YB (0.72 ppm) had the least value and YA (8.23 ppm) rated highest.

TABLE 1: Anti-Nutrient Composition (ppm) of Yoghurt Produced from Bambara Nut and Tiger nut

Sample	Phytate	Tannin	Oxalate	Trypsin Inhibitor	Saponin	Hydrogen cyanide
YA	15.9±0.24	1.81±0.03	8.23±0.11	2.56±0.03	6.11±0.09	0.01±0.00
YB	15.3±0.14	1.92±0.04	0.72±0.16	2.72±0.09	7.48±0.08	0.05±0.02
YC	9.36±0.04	1.52±0.03	6.85±0.07	2.14±0.04	6.38±0.05	0.01±0.00

Phytochemical Composition (mg/100g) of Yoghurt Produced from Bambara Nut and Tiger nut

The result in Table 2 shows the phytochemical composition of the yoghurt processed from Bambara nut and Tiger nut yoghurt. The three samples differed significantly ($P < 0.05$). The flavonoids content ranged from 24.27 to 36.83 mg/100g and the highest value was found in YC (36.83mg/100g), while the lowest value was found in YB (24.27mg/100g).

TABLE 2: Phytochemical Composition (mg/100g) of Yoghurt Produced from Bambara Nut and Tiger nut

Sample	Flovonoids	Glyosides	Alkaloids	Phenolics
YA	32.41±0.41	86.18±1.15	11.79±0.20	48.15±0.15
YB	24.27±0.08	31.11±0.23	8.49±0.04	40.10±0.08
YC	36.83±2.84	30.73±0.32	40.10±0.08	44.08±0.14
YA	-	Bambara nut and Tiger nut Yoghurt		
YB	-	Bambara nut Yoghurt		
YC	-	Tiger nut		

Conclusion

The study showed that Bambara and tiger nut yoghurt can make significant contributions to human the diet.

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Influence of Dietary Ginger (*Zingiber officinale*) Fiber on the Physicochemical, Antioxidant, Microbiological and Sensory Properties of Functional Maize Pap (ogi)

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KEYWORDS: Dietary fibers, epidemiological, ginger, ogi, physicochemical.

BACKGROUND AND OBJECTIVES

Dietary fiber contains a unique and considerable amount blend of bioactive components including vitamins, minerals, phytochemicals and antioxidants. Epidemiological studies have demonstrated that consumption of dietary fiber intake is inversely related to obesity, Type-2 diabetes and cardiovascular diseases¹. The main active phytochemicals present in ginger are gingerols, shogols and paradols, and they have strong antioxidant and chemo preventive properties. Ogi is a fermented cereal traditionally prepared from maize, sorghum or millet predominantly used as a traditional infant weaning food as well as breakfast meal for many adults in Africa. Researchers has enriched the nutrient and antioxidant characteristics of ogi by using various plants extracts. However, little information exists on the enrichment of ogi using ginger fiber, this study set to evaluate the effect of addition of ginger fiber on the physicochemical, antioxidant, microbiological and sensory characteristics of ogi.

MATERIAL AND METHOD

Sources of raw materials

Maize and ginger were obtained from a local market in Sango, Saki Oyo State. All chemicals and reagents used are analytical grade obtained from the Department of Food Science and Technology laboratory, Oke-Ogun Polytechnic Saki, Oyo State, Nigeria.

Sample preparation

Production of ogi from yellow maize and ginger fiber

The ogi was made using the modified method reported by². Ginger fibers were obtained by treating the bleached ginger residue in 85 % ethanol with a defined ethanol/residue ratio at fixed time and temperature on a magnetic stirrer. The mixture was filtered and the residue was recovered to undergo several other treatment cycles³

Determination of Proximate Composition of the Samples, Physicochemical and Antioxidant properties of the sample

Proximate composition was determined using AOAC⁴ procedure. The 1,1-diphenyl-2-picrylhydrazyl (DPPH) scavenging activity was determined using the method described by⁵ with some modifications.

RESULTS AND DISCUSSION

The fat content of the samples ranged from 8.12 to 10.23 % for (O₂₅GF₂₅) and (OG₁₅₀) as shown in Table 1. It should be noted from the study that as the concentration of ginger fiber increases, the fat content decreased. It has been reported that increased consumption of dietary fiber resulted in a decrease in fat content in diet and this may be attributed to the fact that fat digestibility decreased as dietary fiber increased⁶. The fiber content ranged from 1.02 to 5.67 % for (OGI₅₀) and (O₂₅GF₂₅). Addition of ginger fiber was found to significantly improved the fiber content of

the *ogi*. Consumption of dietary fiber can have many beneficial biological effects such as laxative effect on gastrointestinal tracts, increased fecal bulk and help reduce plasma cholesterol.

Table 1. Proximate and DPPH Composition (%) of the Samples

Sample	Moisture	Fat	Protein	Fiber	Ash	Carbohydrate	DPPH
OGI₅₀	15.39 ^a	10.23 ^a	9.46 ^b	1.02 ^f	2.00 ^e	61.90 ^b	15.67 ^f
O₄₅GF₅	13.20 ^d	9.47 ^b	9.87 ^a	3.04 ^e	2.90 ^d	61.52 ^c	16.33 ^e
O₄₀GF₁₀	13.46 ^c	8.64 ^c	9.39 ^c	4.26 ^d	2.97 ^c	61.28 ^e	17.09 ^c
O₃₅GF₁₅	12.46 ^e	8.47 ^d	9.20 ^d	5.26 ^c	2.97 ^c	61.64 ^d	17.26 ^b
O₃₀GF₂₀	14.37 ^b	8.20 ^e	9.15 ^e	5.45 ^a	2.95 ^b	59.88 ^f	17.77 ^a
O₂₅GF₂₅	11.25 ^f	8.12 ^f	9.01 ^f	5.67 ^a	2.99 ^a	62.96 ^a	17.00 ^d

Mean (\pm) values with different alphabetical superscripts in a column differ ($P > 0.05$) significantly

Legends: OGF: Ogi-ginger fiber

DPPH: 1,1-diphenyl-2-picrylhydrazyl

CONCLUSION AND RECOMMENDATIONS

The fibre contents of the *ogi* increases with addition of ginger fiber. The high amount of antioxidant found in the *ogi* indicated that the samples have some bioactive components that can confer health benefits to the consumer upon regular consumption. Conclusively, enrichment of *ogi* with ginger fiber will provides health benefits and acts as a functional drink that satisfies consumer interest.

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Nutritional Knowledge and Consumption of Functional Foods among Public School Teachers in Ife Central Local Government Area of Osun State, Nigeria

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KEYWORDS: Nutritional Knowledge, Functional Foods, School Teachers

BACKGROUND AND OBJECTIVES

Functional foods are products that contain various biologically active compounds and which, when consumed in a current diet, contribute to maintaining the optimal state of physical, and mental health of the population [1]. According to Aramesh and Ajoudanifar [2] biologically active compounds reduce the risk of developing diseases such as atherosclerosis, hypertension, myocardial infarction, diabetes, etc. Teachers are affected both physically and economically, and are emotionally disturbed when they become sick. This consequently affects their efficiency in the line of discharging their duties [3]. This study investigated the nutritional knowledge and consumption of functional foods among public school teachers in Ife Central Local Government Area of Osun State, Nigeria.

MATERIALS AND METHODS

A descriptive survey design was adopted for the study. A simple random sampling technique was used to select 208 teachers from both primary and secondary school from six wards in Ife Central Local Government Area [4]. The semi structured interviewer administered questionnaire was used to obtain information on socio-demographic, nutritional knowledge and consumption level of functional foods of the respondents. Nutritional knowledge was scale on maximum score of twenty with less than nine marks is accorded low knowledge, ten to thirteen as moderate and fourteen to twenty as high knowledge. Data was analyzed using descriptive and chi-square test at 5% level of significant was applied to the data using Statistical Package for Social Sciences (SPSS), version 22.

RESULTS AND DISCUSSION:

The sociodemographic characteristics of the respondent showed that 208 teachers (120 females (57.7%) and 88 males (42.3%)) participated in the study having an average aged of 39 ± 9.7 years. Majority (85.7%) of respondents are degree holders, this is in agreement with Fadupin [4] having more females than male. The respondents had 17.3% low, 66.4% moderate and 16.3% high dietary knowledge on functional foods. The functional food consumption level of the respondents was 15.4% low, 74.5% moderate and 10.1% high (Fig 1). Factors influencing consumption of functional foods include cost (86.1%), season (82.7%), taste (67.3%), knowledge (73.6%), health (71.2%) and age (53.8%) in order of decreasing influence. Findings show that cost (86.1%) is the major factor influencing functional foods consumption most.

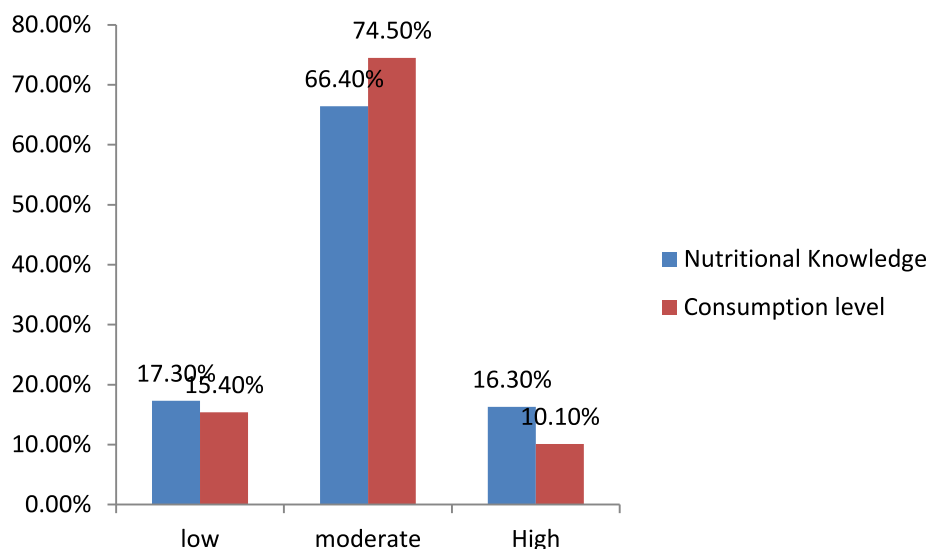


Fig 1: Nutritional Knowledge and Consumption level of Functional Foods among Respondents.

CONCLUSION AND RECOMMENDATION(S)

The study showed that most public school teachers in Ife Central Local Government Area of Osun State have moderate nutritional knowledge on functional foods and moderate level of their consumption. It also showed that cost, season, knowledge and health were the major factors influencing functional food consumption among the respondents. It is recommended that government and professional bodies should intensify effort on nutrition education for teachers.

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Dietary pattern of Iron-rich food consumption and prevalence of malnutrition among In-school adolescents in two LGAs in Southwestern Nigeria

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KEYWORDS: Dietary pattern, Iron-rich foods, malnutrition, In-school adolescents

BACKGROUND AND OBJECTIVES:

Adolescence is the second most critical period of physical growth in the life cycle after the first year of infancy. Inadequate diet has contributed a lot to the poor nutritional status of adolescents [1]. Issues around dietary iron intake and prevalence of undernutrition among adolescent girls are an alarming global problem and affect about one-third of the world's population [2, 3]. Many interventions have either focused on children under-five or pregnant and lactating women. However, little attention has been given to adolescents' nutrition in developing countries. This study investigates the dietary pattern of iron-rich food consumption and the prevalence of malnutrition among in-school adolescents in two local government areas (LGA) in Southwestern Nigeria.

MATERIALS AND METHOD:

Study Design: It was a descriptive cross-sectional study. The study took place at selected rural comprehensive schools at Ise-Orun LGA in Ekiti State and selected Urban schools at Ile-Ife, Osun State.

Study Participants & Instruments: The study participants are early adolescents who attend secondary schools in Ife central LGA, Ile-Ife and Ise-Orun LGA in Ekiti State. A total of 110 in-school adolescents were selected from two rural comprehensive secondary schools in Ekiti State and 190 from five secondary schools in Ile-Ife using a multi-stage sampling technique. These selected schools were part of the schools visited during the adolescent girls' health advocacy programme in these locations. A facilitated semi-structured interviewer-administered questionnaire with three sections was used to elicit information. Section A assessed the socio-demographic characteristics of participants, section B assessed dietary patterns using a food frequency questionnaire, and section C measured the average weight and height used to calculate the nutritional status of participants. Chi-square and t-test were used to test for differences in categorical and continuous variables, respectively, and the significance was set at $p < 0.05$.

RESULTS AND DISCUSSION:

Table 1: Socio-demographic characteristics and Nutritional Status of Participants

Variables	Ife Central LGA n(%)	Ise-Orun LGA n(%)	Test statistics
Age group (yrs.)			
10-14	179(62.4) $X=11.70\pm 1.29$	108(37.6) $X=11.67\pm 1.18$	$t=0.506$, $p=0.613$
Religion			
Christianity	135(75.4)	69(63.9)	$\chi^2 =6.810$, $p=0.033^{**}$
Islam	44(24.6)	37(34.2)	
Traditional	0(0)	2(1.9)	
Ethnicity			
Yoruba	166(92.7)	78(72.9)	$\chi^2 =21.048$, $p=<0.001^{**}$
Igbo	12(6.7)	27(25.2)	
Hausa	1(0.6)	2(1.9)	
Level of study			
Junior	154(86.0)	79(73.1)	$\chi^2 =7.322$, $p=0.008^{**}$
High	25(14.0)	29(26.9)	
Position in the family			
1 st	72(40.2)	39(36.1)	$\chi^2 =6.476$, $p=0.039^{**}$
2 nd	53(29.6)	47(43.5)	
3 rd & above	54(30.2)	22(20.4)	
Education level			
No formal	0(0)	10(9.3)	$\chi^2 =53.505$, $p=<0.001^{**}$
Primary	4(2.2)	12(11.1)	
Secondary	35(19.6)	44(40.7)	
Tertiary	140(78.2)	42(38.9)	
BMI-for-Age			
Thinness	20(23.2)	4(4.1)	$\chi^2 =39.501$, $p=<0.001^{**}$
Normal	22(25.6)	59(60.2)	
Overweight	32(37.2)	12(12.2)	
Obese	12(14.0)	23(23.5)	
HAZ			
Stunting	20(23.3)	27(35.5)	$\chi^2 =13.118$, $p=0.004^{**}$
Mild/moderate	22(25.6)	23(30.3)	
Normal	32(37.2)	26(34.2)	
Tall	12(14.0)	0(0)	

****statistically significant**

- There was no statistically significant difference in the mean age of the participants ($p > 0.05$)
- Within each LGAs, most participants were Christians, Yoruba tribe, in their junior secondary class and have educated caregivers. These variables were statistically significant between the two LGAs ($p < 0.05$).
- Thinness (23.2%) and overweight (37.2%) were higher in Ife central LGA, while obesity (23.5%) and stunting (35.5%) were higher in Ise-Orun LGA among In-school adolescents.

Table 2: Dietary pattern of Iron-rich food consumption among participants

Variables	Ife Central LGA n(%)	Ise-Orun LGA n(%)	Test statistics
Cereals			
≥4times/wk	151(84.4)	86(95.6)	$\chi^2 = 7.165, p = 0.009^{**}$
<4times/wk	28(15.6)	4(4.4)	
Legumes, Nuts & Seeds			
≥4times/wk	72(40.2)	71(78.9)	$\chi^2 = 35.957, p = < 0.001^{**}$
<4times/wk	107(59.8)	19(21.1)	
Dark Green Leafy Vegetables			
≥4times/wk	7(7.8)	64(35.8)	$\chi^2 = 24.127, p = < 0.001^{**}$
<4times/wk	83(92.2)	115(64.2)	
Fruits			
≥4times/wk	87(48.6)	36(40.0)	$\chi^2 = 1.786, p = 0.196$
<4times/wk	92(51.4)	54(60.0)	
Organ Meat			
≥4times/wk	58(32.4)	1(1.1)	$\chi^2 = 34.247, p = < 0.001^{**}$
<4times/wk	121(67.6)	89(98.9)	
Flesh Meats			
≥4times/wk	116(64.8)	20(22.5)	$\chi^2 = 42.620, p = < 0.001^{**}$
<4times/wk	63(35.2)	69(77.5)	
Eggs			
≥4times/wk	117(65.4)	4(4.4)	$\chi^2 = 89.805, p = < 0.001^{**}$
<4times/wk	62(34.6)	86(95.6)	
Fish			
≥4times/wk	118(65.9)	38(42.2)	$\chi^2 = 13.808, p = < 0.001^{**}$
<4times/wk	61(34.1)	52(57.8)	

- In Ife Central LGA, the intake of legumes, nuts and seeds, dark green vegetables, fruits and organ meats among participants was below average.
- In Ise-Orun LGA, the intake of dark green vegetables, fruits, organ meats, flesh meats, eggs and fish was below average.
- Overall, only 23.6% and 46.9% meet the minimum dietary intake of Iron-rich foods in Ise-Orun and Ife Central LGAs, respectively.

CONCLUSION AND RECOMMENDATION(S):

- The dietary pattern of Iron-rich food among in-school adolescents is still far from optimal.
- The double burden of malnutrition is present in the studied population.
- The early adolescent phase should be targeted for effective nutrition intervention as this would help improve their nutritional status.

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Awareness and Consumption Pattern of Biofortified Foods and Its Products Among Urban Residents of Odeda Local Government Area, Ogun State, Nigeria.

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KEYWORDS: Awareness, Biofortified Food Products.

BACKGROUND AND OBJECTIVE:

Bio-fortification is considered a potential strategy for tackling malnutrition. However, since the introduction of biofortified food products, there seems to be low consumption among the population [1]. Thus, this study investigated the awareness and consumption patterns of bio-fortified food products among urban residents of Odeda Local Government Area of Ogun State.

MATERIALS AND METHOD: This study employed a descriptive and cross-sectional study design to assess the level of awareness and consumption pattern of biofortified food products among 270 respondents residing in urban areas of Odeda Local Government, Ogun State. The socio-demographic, economic characteristics and awareness level on biofortified food products of the respondents were assessed using a pretested questionnaire and awareness score index was created. A modified food frequency questionnaire was used to assess the consumption pattern of the bio-fortified food products and some fortified food products among the respondents.

RESULTS AND DISCUSSION: Table 1 shows that higher percentage (38.5%) of the respondents had a fair knowledge, 33.3% had a good knowledge, while 28.2% had a poor knowledge of bio-fortified food products. Majority (78.9%) of the respondents has never tasted biofortified food products, 17.8% consumed it once in a while and about 3.3% of the respondents consumed biofortified food products frequently. According to Table 2, it was also observed that there was a significant association (P -value ≤ 0.05) between the respondents between age, marital status, educational level, occupation and awareness level of the respondents. This finding is similar to the result of [2] which reported that 46.1% of the respondents had fair awareness level on bio fortified foods.

Table 1: Level of Awareness of Bio-fortified Food Products Among the Respondents

	Grades							
	Poor		Fair		Good		Total	
Variable	F	%	F	%	F	%	F	%
Awareness Level	76	28.1	104	38.5	90	33.3	270	100.0

Table 2: Association between awareness level, socio-demographic and economic characteristics of the respondents.

Variables	Poor		Fair		Good		χ^2	Total	P-value
	F	%	F	%	F	%			
Age (Years)									
20 – 25	8	3.0	14	5.2	27	10.0		49	18.1
26 – 30	13	4.8	44	16.3	40	14.8		97	35.9
31 – 35	17	6.3	17	6.3	7	2.6		41	15.2
36 – 40	22	8.1	14	5.2	9	3.3		45	16.7
41 – 45	16	5.9	15	5.6	7	2.6		38	14.1
Gender									
Male	24	8.9	32	11.9	30	11.1		86	31.9
Female	52	19.3	72	26.7	60	22.2		184	68.1
Marital Status									
Single	14	5.2	28	10.4	50	18.5		92	34.1
Married	56	20.7	68	25.2	31	11.5		155	57.4
Widowed	4	1.5	4	1.5	3	1.1		11	4.1
Divorced	2	0.7	3	1.1	2	0.7		7	2.6
Cohabiting	0	0.0	1	0.4	4	1.5		5	1.9
Family structure									
Monogamy	64	23.7	86	31.9	74	27.4		224	83.0
Polygamy	11	4.1	18	6.7	15	5.6		44	16.3
Others	1	0.4	0	0.0	1	0.4		2	0.7
Educational status									
Primary	18	6.7	23	8.5	1	0.4		42	15.6
Secondary	25	9.3	42	15.6	16	5.9		83	30.7
Tertiary	13	4.8	27	10.0	72	26.7		112	41.5
No Formal Education	20	7.5	12	4.4	1	0.4		33	12.2
Occupation									
Artisan	29	10.7	38	14.1	14	5.2		81	30.0
Farmer	1	0.4	2	0.7	2	0.7		5	1.9
Trader	34	12.6	38	14.1	18	6.7		90	33.3
Civil Servant	3	1.1	10	3.7	15	5.6		28	10.4
Student	4	1.5	10	3.7	37	13.7		51	18.9
Others	5	1.9	5	1.9	4	1.5		14	5.2

CONCLUSION:

The associated socio-demographics and economic characteristics influences the respondent's awareness level on biofortified foods and low percentage consumed it frequently.

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Mineral analysis and sensory evaluation of cookies produced from unripe plantain, green peas and coconut for older adults

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KEYWORDS: Blending ratio, Cereal fortification, Composite flour, Sensory evaluation

BACKGROUND AND OBJECTIVE:

Snacking has formed part of daily foods which provide energy during the day before actual meal time. Choice of nutritious and healthy foods for the elderly, however, is a major challenge in Africa especially due to limited crop varieties. The indigenous crops are underutilized as against the use of imported wheat flour in production of snacks. In Nigeria and many African countries, plantains are used as an inexpensive source of calories [1]. Coconut flour is a significant source of dietary fibre, free of trans-fatty acids and low in digestible carbohydrate. This promotes cardiovascular health [2] and it can be used as bulking agents, filling agents and as a substitute for wheat, rice and potato at certain levels. Insoluble fibre is abundantly present in green peas which aids in easy expulsion of stools [3]. This study aimed to optimize the nutritional and sensory quality of cookies through combination of various local ingredients.

MATERIALS AND METHOD:

A constrained D- optimal mixture experiment with 12 runs was designed using Minitab version 16 software package. Range of ingredients were unripe plantain 51.7-55g/100g, coconut 30.0-35.0g/100g and green peas 10.0 -15.0g/100g. Six distinct samples coded UPCGP 1,3,5,7,9 & 11 (see key below) were selected from the blends based on wide differences in mixture ratio. They were evaluated for calcium, iron, magnesium and potassium. Selected blends of unripe plantain, green peas and coconut flours was mixed with 12grams of date syrup, 100ml water baked into cookies and presented for sensory evaluation

RESULTS AND DISCUSSION:

Potassium was highest in sample 3 and lowest in samples 1 and 7, magnesium highest in sample 11 lowest in 1, calcium highest in sample 11 and lowest in 3, while iron is highest in sample 9 and lowest in 3. Potassium and calcium increased as quantity of green peas increased; iron increased with unripe plantain; while increase in magnesium did not follow any pattern. Sensory evaluation carried out shows Sample UPCGP 9 was the most preferred in terms of taste with a mean score of (6.65 ± 1.87) , while sample UPCGP 11 was the least preferred in terms of taste with a mean score of (5.05 ± 1.32) respectively. UPCGP 9 was the most preferred in terms of texture with a mean score of (6.55 ± 1.70) , while sample UPCGP 7 was the least preferred in terms of texture with a mean score of (4.90 ± 1.74) respectively. Sample UPCGP 9 was the most preferred in terms of colour with a mean score of (6.75 ± 1.74) . While UPCGP 3 was the least preferred with a mean score of (4.65 ± 1.39) . Sample UPCGP 11 was the most preferred in aroma with a mean score of (6.70 ± 1.72) . While UPCGP 3 was the least preferred with a mean outcome of (5.60 ± 1.35) respectively.

Table 1: Heavy Metal Analysis-Mineral Analysis

S/N	MINERAL ANALYSIS	UPCGP 1	UPCGP 3	UPCGP 5	UPCGP 7	UPCGP 9	UPCGP 11
		mg/100g	mg/100g	mg/100g	mg/100g	mg/100g	mg/100g
1	Potassium (K)	10.80	12.00	11.50	10.80	11.10	11.30
2	Magnesium(Mg)	19.80	21.90	20.30	22.90	22.40	24.90
3	Calcium (Ca)	8.05	6.95	8.20	7.80	7.80	8.30
4	Iron (Fe)	0.296	0.180	0.210	0.120	0.370	0.220

Table 2: Results for the sensory evaluation of cookies produced from unripe plantain flour, coconut flour and green pea flour.

SAMPLE	TASTE	TEXTURE	COLOUR	AROMA	GENERAL ACCEPTABILITY
UPCGP 1	6.30±1.63 ^{bc}	5.80±1.58 ^{ab}	5.70±1.95 ^{abc}	6.60±1.39 ^b	6.05±1.15 ^{ab}
UPCGP 3	5.30±1.42 ^{ab}	5.45±1.19 ^a	4.65±1.39 ^a	5.60±1.35 ^a	5.85±1.14 ^a
UPCGP 5	5.75±1.55 ^{abc}	5.30±1.22 ^a	5.55±1.79 ^{ab}	6.40±1.14 ^{ab}	6.30±1.38 ^{ab}
UPCGP 7	5.25±1.89 ^{ab}	4.90±1.74 ^a	5.00±1.56 ^{ab}	5.90±1.62 ^{ab}	5.80±1.54 ^a
UPCGP 9	6.65±1.87 ^c	6.55±1.70 ^b	6.75±1.74 ^c	6.55±1.19 ^{ab}	6.90±1.52 ^b
UPCGP 11	5.05±1.32 ^a	5.55±1.67 ^{ab}	5.90±1.65 ^{bc}	6.70±1.72 ^b	6.55±1.32 ^{ab}

UPCGP 1: 55.0g unripe plantain flour, 32.5g coconut flour, 12.5g green pea flour; UPCGP 3: 55.0g unripe plantain flour, 30.0g coconut flour, 15.0g of green pea flour; UPCGP 5: 54.2g unripe plantain flour, 31.7g coconut flour, 14.2g green pea flour; UPCGP7: 55.0g unripe plantain flour, 35.0g coconut flour, 10.0g green pea flour; UPCGP 9: 55.2g unripe plantain flour, 34.8g coconut flour, 10.0g green pea flour; UPCGP 11: 51.2g unripe plantain flour, 33.3g coconut flour, 15.0g green pea flour

UPCGP 1: 55.0g unripe plantain flour, 32.5g coconut flour, 12.5g green pea flour; UPCGP 3: 55.0g unripe plantain flour, 30.0g coconut flour, 15.0g of green pea flour; UPCGP 5: 54.2g unripe plantain flour, 31.7g coconut flour, 14.2g green pea flour; UPCGP7: 55.0g unripe plantain flour, 35.0g coconut flour, 10.0g green pea flour; UPCGP 9: 55.2g unripe plantain flour, 34.8g coconut flour, 10.0g green pea flour; UPCGP 11: 51.2g unripe plantain flour, 33.3g coconut flour, 15.0g green pea flour

Data are mean values of twenty panelist's ± standard deviation. Mean values with the same letter within the same column are not significantly different (p <0.05).

CONCLUSION AND RECOMMENDATIONS

The results shows that UPCGP 9 is the most acceptable with a mean outcome of (6.90±1.52) while UPCGP7 is the least preferred in terms of general acceptability with a mean score of (5.80±1.54). This indicates that cookies made from highest quantity of unripe plantain and second highest quantity of coconut will constitute a good flour blend.

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OD23

Factors Influencing Adherence To Dietary Recommendations Among Type II Diabetes Patients Attending Federal Medical Centre, Idi Aba, Abeokuta

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KEYWORDS: Adherence, Dietary recommendations, Type 2 diabetes mellitus.

BACKGROUND AND OBJECTIVE:

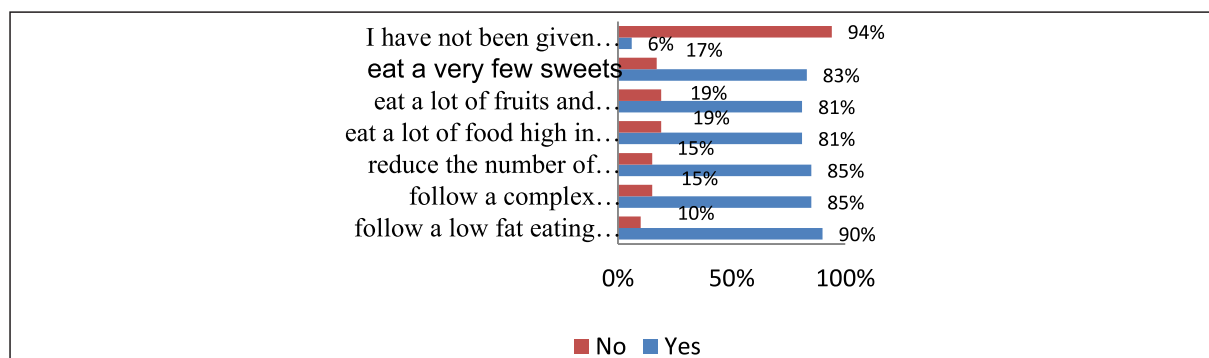
Dietary modification is one of the basic and integral parts of type 2 diabetes mellitus management and this gives a desired result when the dietary recommendations are strictly adhered to. However various studies has reported non adherence to these dietary recommendation, identification of factors or reasons for this is imperative. Thus this study was conducted to identify the factors influencing adherence of type 2 diabetes mellitus patient attending Federal Medical Centre Abeokuta to recommended dietary practices.

MATERIAL AND METHODS: A cross-sectional and descriptive study involving 100 respondents selected randomly from type 2 diabetes patients who has had at least one follow up visit at the Federal Medical Centre Abeokuta. Using a semi-structured and interviewer administered questionnaire, data on socio demographic and economic characteristics, dietary recommendation, compliance level of the respondents, and factors affecting the adherence of the type 2 diabetes mellitus patient to the recommended dietary practices were obtained. Data obtained were analysed using statistical package for socio sciences (spss) version 25.0

RESULTS AND DISCUSSION: More than half (70.0%) of the study population were female while others (30.0%) were male. About half (45%) of the respondents were sixty years of age and above while 40%, 13% and 2% were between the age bracket of 41-59 years, 26-40 years and 18-25 years of age respectively. Majority (66%) of the respondents were married and most (82%) of the study population were engaged in their personal businesses. Most of the respondents (83%, 81%, 81%, 85%, & 90%) reported that their health care provider advised them to eat very few sweets, lot of fruit and vegetables, high fibre diet, low calorie diet, complex carbohydrate and low fat diet respectively as presented in figure 1. More than half (52%) of the study population always adhere to these dietary recommendation while 30%, 11% and 1% do follow the recommendation occasionally, rarely and not at all respectively. The prevalence of non-adherence observed in the present study is lower than the value reported in a similar study conducted at FMC Abeokuta and Ethiopian teaching hospitals (1, 2), and higher than the value reported by in the study conducted at University of Gondar Comprehensive Specialized Hospital in Ethiopia (3).

Table 1: Adherence level of the respondents to the dietary recommendations

Variable	Frequency (n)	Percentage (%)
How often did you follow the recommended dietary practice		
All the time	52	52.0
Occasionally	30	30.0
Rarely	11	11.0
Not at all	1	1.0



(Figure2). 1: dietary recommendations for diabetes management

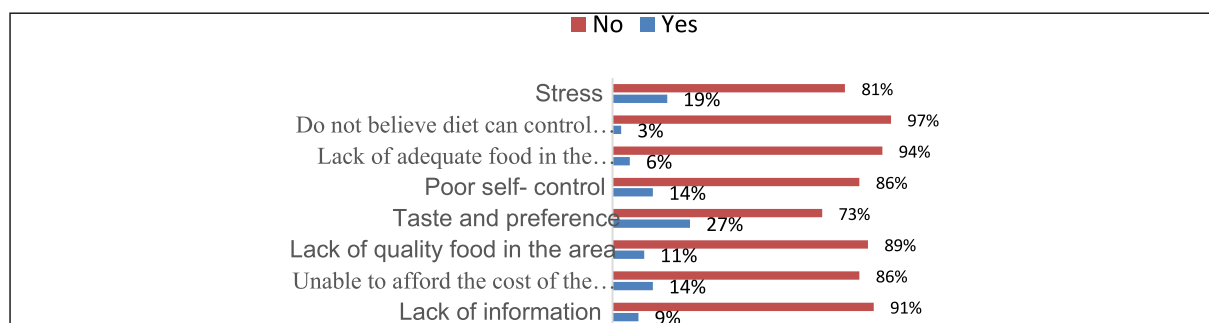


Figure 2: Factors affecting adherence to dietary recommendation

CONCLUSION AND RECOMMENDATION: High occurrence of non-adherence to dietary recommendation was discovered in the present study and this was found to be due to taste and individual preference to different food. Thus health care providers should formulate healthy diets that are close to patients' preferences.

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Nutritional and Microbiological Assessment of Yellow Maize Vended At Aroma Awka Anambra State

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KEYWORDS: Nutrients, Public Health, Gluten free, Maize (*Zea mays*).

Background and objective of the study:

Maize (*Zea mays* L.) is one of the most consumed gluten free cereal grains all over the world, along with rice (FAOSTAT, 2014). Gluten a complex protein is found mainly in cereals like wheat, barley, rye and triticale, but absent in Maize, Soy bean, and Rice (Raghu *et al.*, 2017). Maize is a major cereal crop for human nutrition, with its high content of Carbohydrates, Fats, Proteins, some of the important Vitamins and Minerals as it acquired a well-deserved reputation as a poor man's nutricereal (Ridhi, 2014). Gluten-free diet is the only medically accepted treatment for celiac disease (Raghu *et al.*, 2017). The sale of roasted maize is quite popular in Aroma Awka, Anambra State but there is few relevant data on its nutritional composition and microbial safety. Nevertheless, maize can also serve as a source for transmitting food borne infections, as a result poor handling and unhygienic practices of local vendors. Hence, this study was carried out to assess microbial and nutritional content of the yellow roasted maize vended at Aroma Awka Anambra state.

Materials and method:

The roasted maize samples were collected from the vendors, using simple random sampling and the Maize (*Zea mays* L) sample were evaluated for proximate quality by method described by the Association of Official Analytical Chemist (AOAC, 2000). The roasted maize sample were analysed for Moisture, Carbohydrate, Protein, Fat, Vitamin, and Ash. Also using standard microbiological method by Chessbrough (2005), the microbial quality was evaluated and microbial isolates identified by biochemical tests.

RESULTS AND DISCUSSION

The result for the yellow maize samples showed moisture (5.20 -7.90%), Ash (1.30 to 3.80%), crude protein (5.00 - 6.60%), crude fibre (1.45 to 3.11%) and lipid content (2.00 to 3.91%). Carbohydrate content was found to be high among the samples (74.79 to 84.75 %). This is an implication that roasted maize is a good source of carbohydrate, protein and fiber and as such good source of energy for celiac patients if added to their diet

Table 1: Nutritional value of roasted yellow maize seeds

Samples	Moisture (%)	Ash (%)	Crude fibre (%)	Crude protein (%)	Crude fat (%)	Carbohydrate (%)
MV1	7.80	1.30	1.48	6.00	2.90	80.52
MV2	5.50	1.30	1.45	5.00	2.00	84.75
MV3	7.90	3.80	1.48	5.30	3.65	77.87
MV4	5.20	3.30	2.31	6.60	3.91	78.68
MV5	6.00	3.30	3.11	6.30	3.50	77.79

KEY; M- maize, V- vendor

The result of the microbial evaluation showed that the maize samples were heavily contaminated with high microbial count. As shown in (Table 2). The total aerobic count of the maize sample ranged from 1.3×10^5 to 9.1×10^5 cfu/g while samples from vendor 4 and vendor 5 show high bacterial count ranging from 4.8×10^5 to 9.1×10^5 cfu/g. The total yeast and mould count range from 1.2×10^5 to 8.4×10^5 . The total coliform count ranged from (Zero) 0 to 6.4×10^5 cfu/g. Faecal coliforms were observed and ranged from (Zero) 0 to 3.3×10^5 cfu/g. While *Staphylococcus* count ranged from 1.1×10^5 to 3.0×10^5 cfu/g. Presence of *Salmonella* spp were seen in eight samples and *Pseudomonas aeruginosa* was isolated in three samples. The yellow maize samples in this study were found to harbour a total of eight bacterial species. These were *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli* and *Salmonella* spp. Four fungi were isolated and they were *Aspergillus niger*, *Rhizopus stoloniter*, *Aspergillus fumigatus* and *Saccharomyces cerevisiae*. The result is of public health importance which showed that roasted maize on the street are often contaminated by bacteria and fungi. Commuters and individual should best prepare or process them at home so as not to be at risk of contracting food borne illnesses.

TABLE 2. MICROBIOLOGICAL ANALYSIS OF ROASTED MAIZE SAMPLE

Sample	Total Aerobic Bacteria (cfu/g)	TY/MC Total yeast and mold count (cfu/g)	Total coliform count (cfu/g)	Faecal coliform count (cfu/g)	<i>Staphylococcus</i> count (cfu/g)	<i>Salmonella</i> Spp	<i>Pseudomonas</i> Spp
Vendor 1							
MV1a	3.1×10^5	1.2×10^5	1.6×10^5	1.3×10^5	1.1×10^5	Present	Absent
MV1b	3.3×10^5	2.0×10^5	1.3×10^5	1.2×10^5	1.2×10^5	Present	Absent
MV1c	3.2×10^5	2.3×10^5	1.4×10^5	1.3×10^5	1.1×10^5	Absent	Absent
Vendor 2							
MV2a	1.9×10^5	1.3×10^5	5×10^4	0	1.0×10^5	Absent	Absent
MV2b	1.3×10^5	1.3×10^5	3×10^4	0	1.0×10^5	Absent	Absent
MV2c	2.0×10^5	1.0×10^5	2×10^4	0	1.6×10^5	Absent	Absent
Vendor 3							
MV3a	2.3×10^5	6.8×10^5	0	1.3×10^5	1.6×10^5	Absent	Present
MV3b	5.5×10^5	3.3×10^5	3.7×10^5	2.3×10^5	1.3×10^5	Present	Absent
MV3c	2.9×10^5	2.0×10^5	1.2×10^5	1.3×10^5	1.8×10^5	Present	Absent
Vendor 4							
MV4a	5.6×10^5	3.3×10^5	3.3×10^5	1.0×10^5	1.5×10^5	Absent	Absent
MV4b	4.8×10^5	3.2×10^5	1.8×10^5	1.2×10^5	2.1×10^5	Present	Present
MV4c	5.3×10^5	3.1×10^5	1.4×10^5	3.3×10^5	1.3×10^5	Absent	Absent
Vendor 5							
MV5a	8.3×10^5	6.3×10^5	3.4×10^5	2.3×10^5	3.0×10^5	Present	Absent
MV5b	9.1×10^5	7.3×10^5	6.4×10^5	2.3×10^5	2.3×10^5	Present	Present
MV5c	7.5×10^5	8.4×10^5	1.4×10^5	3.3×10^5	2.9×10^5	Present	Absent

Key: cfu/g: - Colony forming unit per gram;

Key: M- maize, V-vendor

Conclusion and Recommendation

The study concluded that, roasted yellow maize are high in carbohydrate, crude protein and fibre. The presence of microbial pathogen which is attributable to poor food handling, personal hygiene, packaging materials (old newspaper) for the roasted maize and the environment coupled with vendors and consumers' poor attitudes towards food safety calls for much concern. Educating the food handlers/food vendors on food safety practices and close supervision of ready-to-eat foods sold in the community should be carried out by relevant authorities like NAFDAC to prevent outbreak of possible foodborne illness

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Evaluation of Nutrient Composition of Raw and Cooked Indigenous Achi (*Brachystegia eurycoma*) Seed Used As A Soup Thickener

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KEYWORDS: Raw Achi, cooked Achi, and Nutrient composition

BACKGROUND

Adequate food production, nutrient, and utilization for a growing world population depend on the continuing success of agricultural research. A healthy diet is a top risk factor for the burden of disease. Poor nutrition not only affects individual capacity; it impacts the potential of whole countries [1]. In Nigeria, most foods are consumed without additional supplement and at times without adequate knowledge of their compositions [2]. *Achi* (*Brachystegia eurycoma*) is widely used to thicken the soup and can be used in place of *ofor*, *ukpo*, cocoyam, and yam flour. The seed is ground to a fine powder and used to increase the viscosity of soups such as *oha* soup, *onugbu* soup, *nsala* soup, and *egusi* soup commonly consumed in Eastern part of Nigeria. It is an excellent seasoning because it can thicken soups without altering the taste. The study was to determine the proximate, mineral, and vitamin composition of both raw and cooked *B. Eurycoma* and its variations.

MATERIALS AND METHODS

The *Achi* (*B. Eurycoma*) was obtained from Umungasi market, Aba, Abia State, Nigeria. The *Achi* was washed, dried, and ground to a fine powder and put in a dark polythene and placed in an airtight container for further analysis on raw samples, while 64g was used as a thickener to cook onugbu soup, thereafter a portion size of 250g was used for further analysis. The proximate, minerals and vitamin composition were analyzed on both samples. All the nutrients were determined in triplicates using the standard assay method AOAC [3]. Data from the study were statistically analyzed using SPSS version 23.0. Average means were separated by least significant (LSD) and significance was judged at 0.05.

TABLE 1: Proximate composition (%) of cooked and raw *Achi*

Parameters	Ash	Moisture	Crude protein	Crude fiber	Fat	Carbohydrate
Raw	3.14±0.02	10.03±0.01	5.90±0.02	2.67±0.01	4.76±0.01	73.5±0.03
Cooked	3.10±0.03	76.40±0.06	4.51±0.06	3.70±0.03	5.43±0.44	6.86 ± 0.50

The proximate composition of the raw and cooked *Achi* shows Raw *Achi* is highest on crude protein 5.90% and carbohydrate 73.5%, while cooked *Achi* was higher with moisture 76.40%, crude fiber 3.70% and fat 5.43%. There was no significant difference in the Ash content of the both samples studied.

TABLE 2 Mineral (mg/100g) and Vitamin composition (iu/100g) of cooked and raw *Achi*

Parameters	Calcium	Sodium	Iron	Retinol (vitamin A)	Thiamin (vitamin B1)	Riboflavin (vitamin B2)	Niacin (vitamin B3)	Ascorbic acid (vitamin C)
Raw	39.05±0.01	31.64±0.02	2.77±0.01	3.52±0.01	0.45±0.02	0.11±0.02	0.22±0.01	2.76±0.01
cooked	264.26±0.00	313.80±3.68	1.68±0.06	335.50±1.70	0.120±0.00	0.040±0.00	0.360±0.00	5.11±0.00

Mineral and vitamin content of the 2 varieties of *Achi* is shown in table 2. Calcium, sodium, vitamin A and vitamin C (262.26, 313.80, 335.50 and 5.11 mg respectively) values of the cooked *Achi* were significantly higher ($P < 0.05$) higher than those of the raw *Achi* (39.05, 31.64, 3.52 and 2.76 mg respectively); while the iron 2.77 mg, thiamin 0.45 mg, riboflavin 0.11 mg of the raw *Achi* were significantly ($P < 0.05$) higher than the value (iron 1.68 mg, thiamin 0.120 mg and riboflavin 0.040 mg) of cooked *Achi*.

CONCLUSION:

This study shows that *Achi* both when raw and cooked contain high amounts of nutrients. The result showed that cooked *Achi* moisture, calcium, sodium and vitamin A were significantly highest in the two varieties whereas raw *Achi* carbohydrate, protein was highest. All the B vitamins determined were below 1 mg/100g

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Nutritional, Functional and Sensory attributes of Ready-to-use Cocoa beverage

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KEYWORDS: Beverage, Cocoa, Micronutrients, Functional properties and hidden hunger

BACKGROUND

Globally, rising demand for foods that give more than just nourishment but also promote health and well-being has led in stratospheric rise in the global market for functional foods and preventative or protective foods with health claims [1]. Plants provide the raw materials for such foods. Cocoa powder is one plant product with such claims that it is widely accepted by consumers not only in Nigeria but around the world. However, research have revealed that consumer acceptance of cocoa powder has begun to drop around the world due to its aftertaste and astringency, which has resulted in a slew of disadvantages for the cocoa beverage industry. Egg shell and vegetable like pumpkin were reported to be a good source of some mineral elements of public health importance like zinc and calcium [1]. Incorporating them into the final cocoa powder product would significantly increase the level of zinc and calcium of the formulation. Therefore, the aim of this study was to formulate and evaluate the nutritional profile of ready-to-use cocoa beverage powder enriched with zinc and calcium.

MATERIALS AND METHODS

PROCUREMENT AND PROCESSING OF THE INGREDIENTS

The food materials (cocoa powder, pumpkin, and eggshells) were purchased from Birnin Kebbi New Market, Kebbi State. The pumpkin seeds were removed, cleaned and shade dried before frying in an oven for 5minutes at 325 degrees, or until the pumpkin seeds are crisp and light golden brown. Similarly, the ginger were sorted manually to remove dirt, peeled and cut into thin slices before shade drying. The eggshells were washed and soaked in 1% normal saline (NaCl) for 5minutes before shade drying. Then the eggshells, pumpkin seeds and ginger were grounded separately, sieved using a 1mm pore sieve and stored in an airtight containers.

Proximate composition was determined in triplicate using standard analytical procedures as reported by [2]. Carbohydrate content was determined by difference. Selected mineral content (Iron, Zinc, Magnesium, Phosphorus, Potassium and Calcium) were determined using atomic absorption spectrophotometer (AAS) (Shimadzu AA-6200 Tokyo, Japan) according to the AOAC method. Sensory evaluation was determined according to [2].

Table 1: Percentage Composition of the Formulations per 100g dry weight

Ingredients	F1	F2	F3
Cocoa Power	67.00	44.00	100
Pumpkin seed	13.00	26.00	-
Egg shell	10.00	20.00	-
Ginger	10.00	10.00	-

Table 1: Percentage Proximate Composition of the Formulated Blends

Constituent	Composition		
	F1	F2	F3
Moisture content	3.0±0.06 ^a	3.5±0.04 ^b	3.5±0.03 ^b
Ash	8.0±0.01 ^a	6.0±0.02 ^b	6.5±0.04 ^c
Protein	4.55±0.1 ^a	4.38±0.33 ^b	4.46±0.21 ^c
Fiber	0.5±0.07 ^a	0.5±0.01 ^a	0.5±0.01 ^a
Lipid	2.5±0.21 ^a	3.0±0.14 ^b	2.0±0.83 ^a
Carbohydrate	81.45±2.33 ^a	82.62±2.22 ^a	83.04±2.06 ^a

Values are mean ± SEM, Values with the same superscript in the same row differ significantly at ($P < 0.05$). (F1 Cocoa powder 67%,Pumpkin 13%,Egg shell,10%,Ginger 10%;F2 Cocoa powder 44%,Pumpkin 26%, Egg shell, 20%,Ginger 10%; F3Cocoa powder 100%)

Table 2: Sensory Attributes of Formulated Blends

Sample	Colour	Aroma	Taste	Mouth-Feel	Overall acceptability
F1	5	5	5	4	4.75
F2	4	5	4	3	4.0
F3	5	4	3	3	3.75

Values are mean ± standard error of the mean (SEM) of triplicate determinations. (F1 Cocoa powder 67% Pumpkin 13%, Egg shell,10%,Ginger 10%;F2 Cocoa powder 44%,Pumpkin 26%,Egg shell,20%,Ginger 10%; F3Cocoa powder 100%)

RESULTS AND DISCUSSION: The moisture content of the formulations was slightly higher than the values recorded by [1]; which may be attributed to processing method. There was a significant difference ($P < 0.05$) for ash contents among the formulated samples. The values for ash in this study suggest that the composite blends are good sources of mineral elements. The sensorial evaluations indicated a significant difference ($P < 0.05$) in the overall acceptability, taste and mouthfeel of the formulations. However, F1 has the highest overall acceptance as indicated in the results obtained for sensory attributes in Table 2.

CONCLUSION: According to the findings of the current study, enrichment of cocoa powder as ready-to-drink beverage with pumpkin seed and eggshell would improve the micronutrient content. The result of the sensory evaluation as revealed by the panelist point to acceptability of beverages prepared with the composite blends.

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OD27

Effect of heat treatment on chemical composition of African nutmeg (*Monodora myristica*)

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KEYWORDS: African nutmeg, nutrient composition, heat treatment.

BACKGROUND AND OBJECTIVE:

African nutmeg (*Monodora myristica*) is a dried seed from perennial plant that is edible and used as a spice in local delicacies as well as in herbal disease management (1). It is a dried seed of a tropical tree that grows naturally in West Africa and cultivated in other parts of the world. African nutmeg is processed in a variety of ways, including boiling, roasting, and frying. Nearly every processing method results in nutrient loss; however, heating has advantages such as reduced microbial load, increased phytochemical availability, and reduced anti-nutrient content of the seeds. The study was carried out to determine the effect of heat treatment on proximate and micronutrient composition of African nutmeg.

MATERIALS AND METHODS:

African Nutmeg was purchased from Ogige market, Nsukka, Enugu State, Nigeria and subjected to three different processing methods (roasting, oven drying and sun-drying) to produce flour. The seeds were sorted and cleaned using distilled water, drained and divided into three equal portions of 500 grams each. The first portion was roasted at 180°C with frequent stirring until a constant weight is achieved. The second portion was oven dried at temperature of 100°C to a constant weight, while the third portion was sun dried and used as control. All samples were shelled and differently milled into powder using Warring blender, sieved through a 120-micrometer aperture, and packaged in airtight polyethylene bag for further analyses. The samples were subjected to chemical analysis using standard methods. Data were analyzed using Statistical Package for Social Science, version 23 and significance was accepted at $p < 0.05$.

RESULTS AND DISCUSSION:

The proximate and micro-nutrient composition of African nutmeg were significantly ($p < 0.05$) affected by the heat processing methods applied. Roasting significantly increased the fat, ash, and crude fibre content of African nutmeg while the oven-dried sample had the highest retention of protein [Table 1]. Roasted sample retained the highest amount of iron, magnesium and thiamin compared to oven-dried and raw samples ($p < 0.05$) [Table 2]. These findings are consistent with that obtained by Ehirim et al. (2) for raw and roasted African nutmeg.

Table 1: Effect of processing methods on proximate composition of African nutmeg

Proximate (%)	Roasted	Oven dried	Raw
Moisture	8.44±0.49 ^b	10.50±0.71 ^{ab}	12.90±0.71 ^a
Fat	17.00±0.00 ^a	19.50±1.41 ^a	12.50±0.71 ^b
Ash	3.95±0.21 ^a	2.95±0.07 ^b	1.20±0.14 ^c
Protein	13.45±0.28 ^b	15.03±0.07 ^a	11.69±0.27 ^c
Crude fibre	24.60±0.28 ^a	21.50±0.42 ^b	19.70±0.99 ^b
Carbohydrate	32.56±0.01 ^b	31.02±1.13 ^b	42.01±0.29 ^a

Values are expressed as mean value ± standard deviation. Values with different superscripts in the same row are significantly different from each other at $p < 0.05$.

Table 2: Effect of processing methods on micronutrient composition of African nutmeg

Micronutrient composition (mg/100g)	Roasted	Oven dried	Raw
Calcium	328.80±1.69 ^b	495.00±5.68 ^a	112.00±0.00 ^c
Iron	9.28±0.40 ^a	7.70±0.25 ^b	7.16±0.06 ^b
Magnesium	141.99±2.84 ^a	90.15±1.34 ^b	86.51±2.42 ^b
Vitamin C	14.68±0.04 ^c	16.10±0.07 ^b	20.97±0.46 ^a
Vitamin E	11.81±0.04 ^c	12.65±0.06 ^b	14.07±0.11 ^a
Vitamin B1	6.39±0.01 ^a	5.64±0.06 ^b	4.67±0.04 ^c

Values are expressed as mean value ± standard deviation. Values with different superscripts in the same row are significantly different from each other at $p < 0.05$.

CONCLUSION AND RECOMMENDATION: Heat (processing) had significant ($p < 0.001$) effects on both the proximate and micronutrient composition of African nutmeg. Roasting retained the most nutrients and should be promoted for use in the processing of African nutmeg.

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OD29

Assessments of Sugar Sweetened Beverages Intake and Body Mass Index of Male Name of Author (s): Undergraduate Students Moshood Abiola Polytechnic, Ojere, Abeokuta, Ogun State.

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KEYWORDS: Sugar Sweetened Beverages, BMI, Calorie, Assessment.

BACKGROUND AND OBJECTIVE:

Sugar sweetened beverages (SSB) are energy drinks that may contain caffeine, taurine, sugar and sweeteners, herbal supplements and other ingredients and are distinct from sports drinks and vitamin drink. Sugar sweetened beverages increase weight, the calories in these products come from sugar and consuming extra calories result in weight gain. The objective of this study was to assess the effect of sugar sweetened beverages intake on Body Mass Index of male students and to determine the quantity and frequency of SSB intake among male students at Moshood Abiola Polytechnic.

MATERIALS AND METHOD:

The population of the research consists of Two hundred and thirty-four (234) male undergraduate students. This study was cross-sectional which include male undergraduate students of Moshood Abiola Polytechnics

Student, Abeokuta from year one (1) - four (4). Multi-stage sampling techniques was use to identified the intake pattern of Sugar Sweetened beverages (SSB) while validated questionnaire which was modified was used to assess the intake of water and other beverages. The questionnaire focus on water, fruit juice and SSB intake. Each respondent filled out all sections of the questionnaire which includes the socio-demographic characteristics, anthropometric assessment data and consumption pattern of sugar sweetened beverages. The weight and height for anthropometric parameters was measured using standard method and the nutritional status was determined based on calculated Body Mass Index.

RESULTS AND DISCUSSION

Results from Table 1 showed that most (%) of the respondents were between the age of 15 and 20 years. Majority (%) of the respondents received monthly income between the range of #5000 and #10000. This study indicates that most (%) of the respondents were Yoruba and most (%) were Muslims. This study revealed that more than half (65.7%) of the respondents have normal BMI, while majority of the respondents (81.6%) frequently consumed carbonated drinks as most prefer SSB. This observation is similar to the reports of (1), which confirmed the fact that consumption of sugar sweetened beverages is very high among the adolescents and young adults all over the world. This study further revealed that there is no significant ($p > 0.05$) relationship between frequent consumption of SSB and BMI. This study also shows that there is no significant difference between energy drinks, fruit drinks and malt drinks and the Body Mass Index of the students but significant association exists between carbonated drinks and Milk drinks at ($p < 0.05$) significant level. This result negates the outcome of (2) study that examined the relationship between sugar sweetened beverage consumption and BMI and concluded that participants with the highest sugar sweetened beverage consumption had a significantly higher BMI compared to the participants with a low sugar sweetened beverage consumption.

CONCLUSION AND RECOMMENDATION:

The study concludes that most MAPOLY students have normal Body Mass Index despite their excessive consumption of carbonated drinks. I hereby recommend that more non-caloric sugar sweetened beverages, milk and soy beverages and water intake should be encouraged. Also, there is need for more research to investigate into the relationship between physical activity and consumption of carbonated drinks among students.

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Comparison of Proximate Composition and Sensory Evaluation of Fufu Powder and Dough Produced from TMEB 419, TMEB 693 and IBAO 11371 Cassava Varieties

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KEYWORDS: Physico-chemical, sensory evaluation, fufu powder, fufu dough, cassava.

BACKGROUND AND OBJECTIVE:

Processing is embarked on mainly to cleanse, enhance palatability as well as to transform into a storable form.⁽¹⁾ Fufu powder is a white fermented carbohydrate food which is processed from tubers of cassava for human consumption⁽²⁾. This study is to compare the proximate composition and sensory evaluation of fufu powder and dough produced from TMEB 419, TMEB 693 and IBAO 11371.

MATERIALS AND METHODS: Three (3) different species of cassava were purchased from the International Institute of Tropical Agriculture (IITA) Ibadan and processed. Samples were analyzed chemically according to the official methods of analysis described by the Association of Official Analytical Chemist⁽³⁾. All analyses were carried out in duplicate. Data was subjected to a one-way Analysis of Variance (ANOVA) using Statistical Package for Social Sciences (SPSS) (20) while Duncan's Multiple Range Test (DMRT) was used to separate the means at $p < 0.05$ significant difference. Results were expressed as mean values and standard deviation of the duplicate determination.

RESULTS AND DISCUSSION: Proximate composition of fufu powder made from TMEB 419, TMEB 693 and IBAO 11371 are shown in Table 1. The study revealed that the proximate composition of fufu powder produced from IBAO 11371 had the highest crude protein (2.24 ± 0.064^a) and crude fat (1.16 ± 0.021^a) contents, fufu powder produced from TMEB 419 had the highest crude fibre (0.38 ± 0.014^a), ash (0.54 ± 0.021^a) and moisture (13.09 ± 0.028^a) contents, whereas fufu powder produced from IBAO 11371 had the highest crude fat (1.16 ± 0.021^a), and lowest crude fibre (0.22 ± 0.014^b), ash (0.33 ± 0.021^b), moisture (12.54 ± 0.028^b) and carbohydrate (83.53 ± 0.021^c) contents. It was observed that carbohydrate was the major component in the powder samples. The carbohydrate content of TMEB 419 powder had slightly higher carbohydrate content (84.44%) which was similar to the result which stated that the carbohydrate content of TME 419 flour was 85.44%¹. A similarly reported high carbohydrate content (83.63%) for TME 419 grown in Abia State, Nigeria⁴. The colour of fufu powder revealed that TMEB 419 and TMEB 693 were both whitish but IBAO 11371 was yellow. This was in line with other researchers that indicated that TMEB 419 was whitish in colour⁵. IBAO 11371 had the highest particle size (95.63%) which passed through a sieve of 0.60mm aperture size. The mineral composition revealed that fufu powder produced from IBAO 11371 had the lowest mineral composition when compared with TMEB 419 and TMEB 693. The sensory evaluation results indicated that fufu dough produced from IBAO 11371 which was yellow in colour was generally acceptable among the fufu dough produced from different cassava cultivars.

Table 1: Proximate composition of fufu powder made from poundable cassava (TMEB 419), poundable TMEB 693 and IBAO 11371

Component (%)	TMEB 419 (Mean±SD)	TMEB 693 (Mean±SD)	IBAO 11371 (Mean±SD)
Crude Protein	1.34±.078	1.14±.078	2.24±.064
Crude Fat	0.22±.014 ^b	0.17±.014 ^b	1.16±.021 ^a
Crude Fibre	0.38±.014 ^a	0.27±.021 ^b	0.22±.014 ^b
Ash	0.54±.021 ^a	0.40±.028 ^b	0.33±.021 ^b
Moisture	13.09±.028 ^a	13.01±.035 ^a	12.54±.028 ^b
Carbohydrate	84.44±.028 ^b	85.03±.001 ^a	83.53±.021 ^c

Note: Figures with the same superscript letter in the same row are not significantly different ($p>0.05$) while figures with different superscript letter in the same row are significantly different ($p<0.05$)

Table 2: Sensory evaluation of fufu dough produced from poundable cassava (TMEB 419), poundable TMEB 693 and IBAO 11371

Attributes	TMEB 419 (Mean±SD)	TMEB 693 (Mean±SD)	IBAO 11371 (Mean±SD)
Colour	1.20±0.42 ^c	2.10±0.32 ^b	2.80±0.42 ^a
Taste	1.60±0.84 ^a	1.30±0.48 ^a	2.00±0.82 ^a
Texture	1.30±0.68 ^b	2.30±0.68 ^a	2.20±0.79 ^a
Acceptability for taste	3.00±1.41 ^a	2.80±1.03 ^a	3.90±0.99 ^a
Acceptability for flavor	3.30±1.42 ^a	3.30±1.16 ^a	4.00±1.05 ^a
Acceptability for texture	2.20±1.37 ^b	3.50±1.18 ^a	4.10±0.99 ^a
General Acceptability	1.30±0.48 ^b	1.50±0.71 ^b	2.70±0.68 ^a
Odd sample	Frequency	Percentage	
TMEB 419	1	10.0	
TMEB 693	9	90.0	
IBAO 11371	0	0.0	

Note: Figures with the same superscript letter in the same row are not significantly different ($p>0.05$) while figures with different superscript letter in the same row are significantly different ($p<0.05$)

CONCLUSION AND RECOMMENDATION:

In conclusion, this study indicated that IBAO 11371 had a suitable physico-chemical property and was generally acceptable after the sensory evaluation. Studies on processes of fermentation, nutritional supplements and suitable chemicals as additives to the fufu powder should be done in order to obtain higher quality of fufu powder. More research on how to enhance the quality, colour, and nutritional value of the fufu powder should be carried out.

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OD31

Trends of Postprandial Blood Glucose Level and Glycemic Index of Subjects Fed with Meals Prepared from Breadfruit.

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KEYWORDS: Postprandial Blood Glucose, Glycemic Index (GI) and Breadfruit.

BACKGROUND AND OBJECTIVE:

The rate at which local foods are being neglected due to lack of relevant information about their nutritional composition, phytochemical, postprandial blood glucose level and glycemic index (GI) contents cannot be over emphasized. Food constituents have significant influence on blood glucose levels, glycemic index, nutritional status and healthy living of people. Therefore, this study determined the postprandial blood glucose level and glycemic index of meals prepared from breadfruit (*Artocarpus altilis*) using four (4) different meals (boiled, fried, pounded and porridge).

MATERIALS AND METHOD: Purposive sampling technique was used to select ten apparently healthy young adults. The subjects were fed equivalent weight that supplied 50g of available carbohydrates of the meals and glucose (as control) after a 10-12 hour overnight fast. Blood samples were collected through finger prick using hypodermic lancet before and after consumption of each meal. Each subject blood samples were tested for glucose level at 30 minutes interval over a period of 2 hour after each meal consumption using standard methods. Incremental area under the curve was determined from the GI graph plotted and the GI values were calculated. Data were presented in frequency counts and percentages. Means were separated using Duncan's Multiple Range Test.

RESULTS AND DISCUSSION: Result showed that the GI of pounded breadfruit was relatively higher compared with GI of other test meals investigated. A significant decrease of GI in subjects fed with boiled breadfruit was observed between 30 and 120 minutes (Figure 1). This method of cooking (boiling) had been shown to have a great impact in controlling the rate at which carbohydrate meals releases its sugar into the blood stream (1). There was significant difference ($p < 0.05$) in the postprandial blood glucose values of the subjects over the duration of the study. The GI of boiled, fried, porridge and pounded breadfruit were 82.21, 82.34, 82.39 and 91.33 respectively.

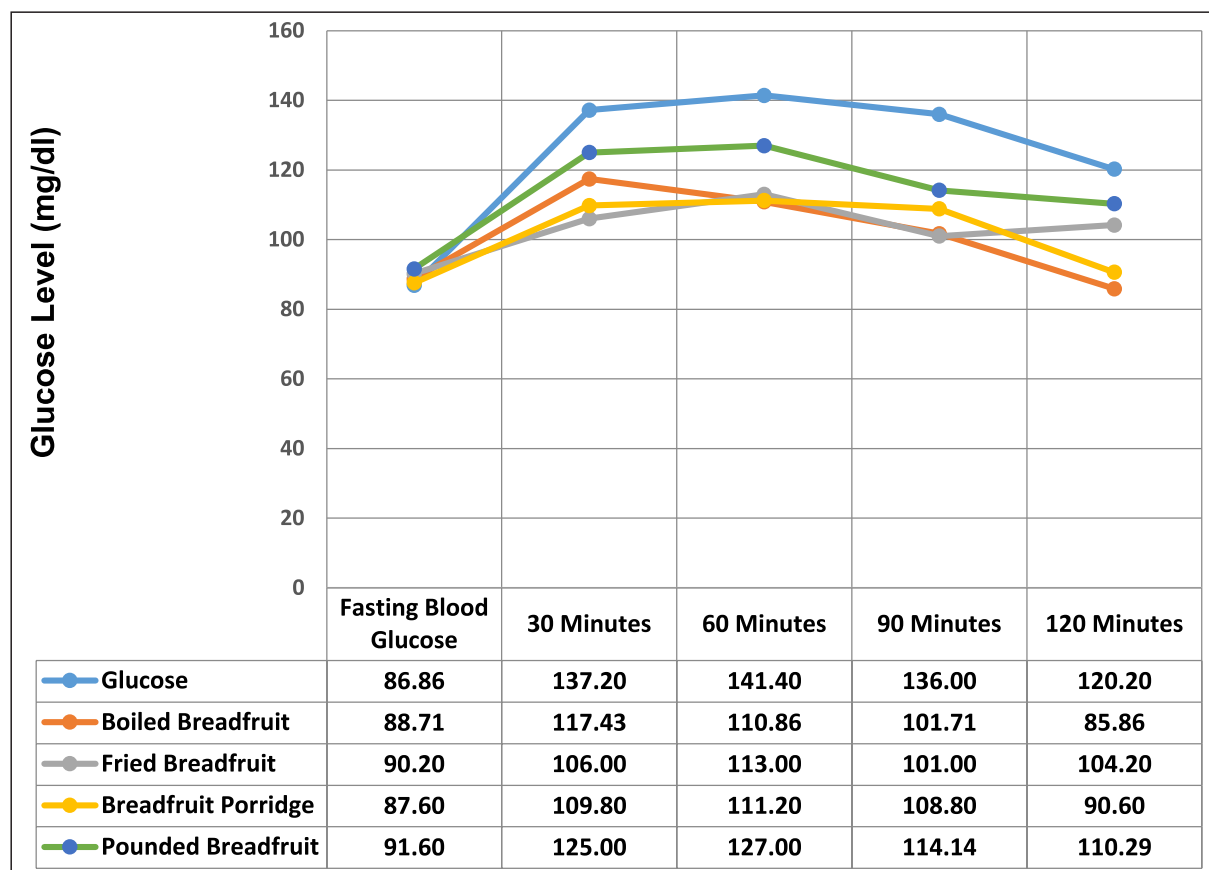


Figure 1: Variations in Postprandial Blood Glucose of Subjects Fed with Glucose and Breadfruit Meals.

CONCLUSION AND RECOMMENDATION:

In conclusion, this study revealed that lowest and highest GI values were obtained in boiled and pounded breadfruit meals respectively. Therefore, it is recommended that boiled breadfruit be consumed rather than the other investigated meals.

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Nutritional Knowledge, Fruits and Vegetables Consumption Pattern Among Civil Servants in Ogun State.

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KEYWORDS: Nutritional knowledge, Fruits, Vegetables, Civil servants

BACKGROUND AND OBJECTIVE:

Adults are faced with lots of work, limited time and little food choices that affect their fruits and vegetables intake. Low fruits and vegetables consumption pattern is a major risk factor for premature mortality. The study assessed the nutritional knowledge and the fruits and vegetables consumption pattern among Civil Servants in Abeokuta, Ogun State.

METHODS: The study involved a descriptive cross-sectional study of civil servants selected by simple random sampling. An interviewer administered questionnaire was used to obtain data on socio-demographic characteristics and nutritional knowledge on fruits and vegetables. The knowledge questionnaire consisted of 10-point knowledge questions on health benefits of fruits and vegetables scored accordingly. Data were analyzed using SPSS 20.0.

RESULTS AND DISCUSSION: The study revealed a bipolar gender distribution of 53.2% male and 46.8% females and were between the ages of 25 and 60years. This pattern of gender distribution was also observed in Lagos and Oyo State (1,2). The educational level indicated most (65.2 %) as graduates with B.Sc./HND and 26.4% with higher degrees. Most (71.2%) exhibited good nutritional knowledge while less than 1% had poor knowledge. This differs from the study in North Central Nigeria with only 1.2% exhibiting good nutritional knowledge (1). The present study was conducted among group of adults who are part of the work force of Ogun State Civil Service who are expected to be educationally qualified for their respective posts, this could be responsible for the good nutritional knowledge exhibited by them as low educational status was reported as responsible for poor knowledge displayed among respondents in another study (3). The most (76.8%) preferred mode of consumption was whole fruit compared to processed fruits (2.4%) with watermelon, apple and orange as the most frequently consumed while sour chop, cashew and pawpaw were the least consumed. For vegetables, tomatoes, dark green vegetables, cucumber were the most frequently consumed against okra and cabbage as the least consumed. This was found to be consistent with the study in Ghana (3). The practice of having five portions of fruits and vegetables consumption daily was reported in 23% (fruits) and 10% (vegetables). This was considered fair enough in comparison with the study among adolescents where only 5.4% had five portions of fruits and vegetables daily (4). This may be attributed to the constraints claimed by the respondents such as seasonal availability (89.6%), high market price (80.4%) and easy spoilage of choice of fruits and vegetables (72.4%). Cost and seasonal availability of

fruits and vegetables have also been reported as determinant limiting adequate fruit and vegetables consumption (3). The study further indicated no significant relationship between the socioeconomic characteristics and nutritional knowledge of the respondents at $p > 0.05$ level of significance.

CONCLUSION AND RECOMMENDATION:

Respondents demonstrated good nutritional knowledge. Watermelon and tomatoes were most preferred fruit and vegetable though there were constraints limiting daily consumption of 5 portions of fruits and vegetables. Families are encouraged to have small gardens within the houses where some fruits and vegetables can be planted to improve availability for home consumption all year round.

Table 1: Nutrition Knowledge Score on Health benefits of fruits and vegetables consumption

Scores	Frequency	Percentage (%)
Poor (0 – 4)	2	0.8
Fair (5 – 7)	70	28.0
Good (8 – 10)	178	71.2
Total	250	100.0

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Mineral Analysis Of Danwake Produced From Composite Flour

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KEYWORDS: [Macr-oNutrients](#), [Micro-Nutrients](#), [Composite Flour](#), [Danwake](#)

BACKGROUND AND OBJECTIVE:

Diet that contains no essential micronutrients and amino acids are the common source of hidden hunger [1]. Most African diets are made from staple crops, such as maize, wheat, rice, and cassava, which provide a large share of energy but relatively low amounts of essential vitamins and minerals. As people's diet largely depends on many factors such as prices and choice influenced by culture, peer pressure, geographical, environmental, and seasonal factors. *Danwake* is an indigenous, stiff dumpling food of the people in the Northern part of Nigeria. This dumpling is originally prepared from beans and sorghum flour or cassava and beans flour or maize and beans flour, dried baobab leaves flour and trona ('*kanwa*') are also added. It was estimated that Nigeria losses about \$300 million annually as a result of millions of Nigerians suffering from hidden hunger. [2] has suggested increase in nutrition knowledge and the consumption of some micronutrients-rich food sources as a means to fight hidden hunger in Nigeria. Therefore, the objective of this study was to determine the mineral content of *Danwake* made from blend of beans, bambara nut, cassava and sorghum flour.

MATERIALS AND METHOD: Beans, sorghum, Bambara nut, cassava, trona and baobab leaves powder were obtained from Yankaba market Kano, Nigeria. There were sorted and dry cleaned manually. The cleaned non decorticated grains was milled separately into flours using a grinding MI-mil High Pressure Roller Grinding Mill. Three blends were obtained from sorghum, beans, Bambara nut, baobab leave powder and trona respectively as follows; Sample A: 31, 34, 30, 3 and 2% ; Sample B:36, 40, 15, 5, and 4% and Sample C: 80, 10, 3, 3, and 4%. Each formulation was weighed exactly 200grams and mixed with 100ml of distilled water to make dough. The dough was stretched to about 2mm thickness and cut into circle shapes and left to dry at 36°C for two days in an oven drier. About 5g of *danwake* sample was ground into powder using a laboratory mortar and pestle. The powder was transferred into a 250 ml volumetric flask and 200 ml distilled water was added. It was then soaked for 24 hours and filtered through a Whatman paper No 1 in a funnel. 10 ml of the filtrate was taken into a one sample vial and analyzed using the Smart spectrophotometer 2000, version 2.0. The following minerals were determined; copper, potassium, magnesium, sodium, lead and Zinc

RESULTS AND DISCUSSION

Table 1: Concentration of Minerals in Three Danwake Samples

CONCENTRATION OF MINERALS (Mg/L)						
FORMULATION	Cu	K	Mg	Na	Pb	Zn
SAMPLE A	ND	13.39	13.95	22.74	0.455	0.508
B	ND	10.95	21.050	28.15	0.381	0.514
C	ND	9.16	18.13	20.06	0.365	0.507

Values are mean of three determination
ND=NOT DETECTED

From the result obtained in **Table: 1**, Cu content in sample (A), (B), and (C) are -0.042mg, -0.044mg, -0.042mg respectively, this indicates that the Cu is in the undetected limit this is compared to the United States tolerable limit of approximately 1.0 to 1.6mg/day [3]. K was found in a higher amount in the three samples. Sample (A) 13.39mg, sample (B) 10.95mg and sample (C), 9.169mg when compared with the research work of [4], K content was 226mg/100g. High level of Mg present are attributed to whole grains, legumes and water from tap. Na was also found to be high particularly in sample (B), Pb was found in very negligible amount in Sample (A) 0.455mg, Sample B 0.381mg and sample C 0.365mg with maximum tolerance limit of 2.5mg/100g. The National Institute for Health considers 40mg of Zn a day to be the upper limit dose for adults but was found in negligible amount in Sample (A) 0.508mg, sample (B) 0.514mg and sample (C) 0.507 mg as compared to [4] 8.6mg/100g.

CONCLUSION AND RECOMMENDATION

It can be deduced that the quality or source of trona and the contribution of other ingredients used in *danwake* flour blends formulation may have impacted on the mineral content of the final product and sample (A) contains more of K, less of Na and Pb, with a considerable amount of Mg and Zn making it a more preferred product for the masses.

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Effect of Consumption Of Pigeon Pea (*Cajanuscajan*) Meals On Postprandial Blood Glucose Of Healthy Adults In Ogun –State.

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KEYWORDS: Postprandial, *moin-moin*, *ekuru*, *akara* and pottage

ABSTRACT: Diets high in glycemic index and glycemic loads have been associated with increased risk of cardiovascular diseases. Therefore, foods high in fibre and low in glycemic index can be used to control and manage diabetes.

OBJECTIVE: The study assessed the effect of composition of different meals prepared from pigeon pea (*cajanus cajan*) and their effect on postprandial blood glucose of apparently healthy adults in Ogun-State

METHODS: A convenient sampling techniques was used to select Ten apparently healthy volunteers aged 18-45 years to participate in the study. The participants were non diabetics, not on medication and without any clinical diseases in line with method described by Kerry *et al.*, (2009). Four test meals (*Akara*, *moin-moin*, *ekuru* and pigeon pea pottage) containing 50 g available carbohydrate were prepared from pigeon pea. Participants were fed with each meal on different days at 30 minutes interval with glucose serving as control in accordance with Eyre *et al.*, (2004). Data obtained were analyzed using Statistical Analysis System, (SAS) and one way analysis of variance (ANOVA) was used to determine the significant difference between samples.

RESULTS: Results revealed that no significant ($p > 0.05$) difference in the fasting blood sugar of the participants before the feeding trial, however, a significant ($p < 0.05$) increase with time was observed in the postprandial blood glucose (PBG) {30 min., 60 min., 90min and 120 min.} of the participants when fed with glucose. Horizontal axis; Time (minutes). Vertical axis; g/dl for blood glucose.

CONCLUSION: The study revealed that pigeon pea meals have lowering postprandial blood glucose response and can be further explored for the management of diabetes mellitus.

RECOMMENDATION: Pigeon pea diets should be included in type 2 diabetes patients menu since they have positive effect on postprandial blood sugar level

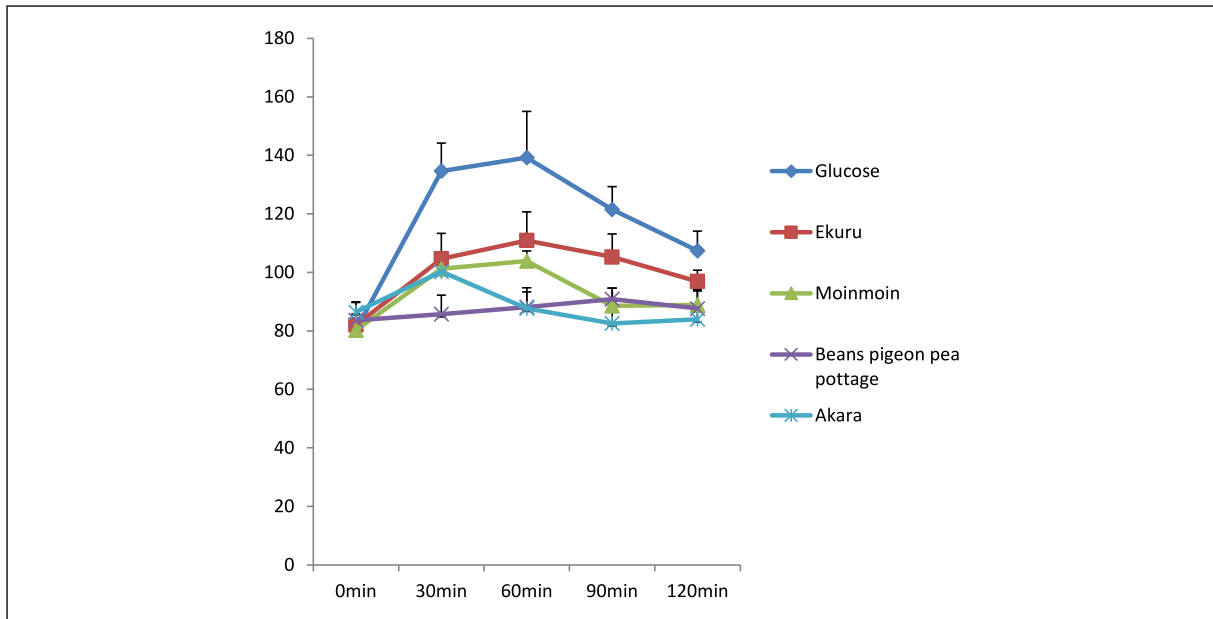


Figure1: Combined blood glucose response of subjects fed with glucose, ekuru, moimoi, akara and pigeon pottage

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Physicochemical and Sensory Properties of Locally Produced Digestive Biscuit from two Varieties of Wheat (*Triticum* spp)

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KEYWORDS: Digestive Biscuit, Wheat flour, Functional Properties and Mineral Composition.

BACKGROUND AND OBJECTIVE:

Biscuits are ready-to-eat cheap, convenient and inexpensive food products, containing digestive and dietary principles of vital importance [1]. Biscuits can be defined as a small thin crispy cake made from hard dough, soft dough or from batters with application of heat in an oven [2]. The principal ingredients are flour, sugar, milk, salt, flavoring agent, egg and butter [3]. Digestive biscuits are generally consumed and have moderately long lifespan and great eating characteristics. This study was designed to produce digestive biscuits locally from two varieties of wheat Reyna-28 (B2) and Norman (B4) flour and to evaluate the physical and functional properties, mineral composition and sensory properties of the digestive biscuit.

MATERIALS AND METHOD: Digestive biscuits were produced from two varieties (Reyna-28 and Norman) of wheat grain. The grains were processed into flour at 100% each with commercial digestive biscuit used as control and analyzed for physical properties, functional properties, mineral composition and sensory evaluation using standard methods.

RESULTS AND DISCUSSION: Results of the functional properties ranged from 0.55-0.72g/m³ for bulk density, 30.31-36.32g/g for water absorption capacity, 4.95-10.12% solubility index. The sodium, potassium, phosphorus, iron and zinc content ranged from 60.23-74.09, 91.35-102.41, 121.78-161.29, 2.46-9.18, 1.43-3.20mg/100g respectively. The digestive biscuits gave good physical properties in terms of weight, height, diameter, thickness and spread ratio. Sensory evaluation revealed that there were significant differences in color, odor, texture, taste between digestive biscuits produced from 100% Reyna-28 wheat flour and 100% Norman wheat flour. Digestive biscuits containing 100% Reyna-28 wheat flour was most preferred than digestive biscuit from 100% Norman wheat flour.

Table 1: Functional Properties of Digestive Biscuits Produced from two Varieties of Wheat Flour

Parameters	Samples				Commercial control
	B1	B2	B3	B4	
Bulk density (g/cm ³)	0.72	0.59	0.84	0.68	0.55
Dispersibility (%)	61.00	61.00	62.00	63.00	72.00
Water absorption capacity (g/g)	36.32	30.31	34.90	31.83	33.01
Solubility index (%)	4.95	9.52	9.90	8/41	10.12
Swelling capacity (%)	1.80	3.12	1.94	2.70	3.50

Key: B1: Digestive biscuit from unprocessed Reyna – 28 wheat

B2: Digestive biscuit from processed Reyna – 28 wheat

B3: Digestive biscuit from unprocessed Norman wheat

B4: Digestive biscuit from processed Norman wheat

Control: Commercial digestive biscuit (Mcvities digestive biscuit)

Table 2: Mineral Composition of Digestive Biscuits Produced from two Varieties of Wheat Flour

Parameters (mg/100g)	Samples				Commercial control
	B1	B2	B3	B4	
Sodium	60.23±4.93 ^a	71.21±6.18 ^b	62.75±3.09 ^c	68.75±5.46 ^d	74.09±3.78 ^b
Potassium	94.68±6.08 ^a	96.75±5.16 ^b	91.55±6.00 ^c	96.00±5.11 ^b	102±7.00 ^d
Phosphorous	136.41±4.50 ^a	138.80±9.02	121.78±10.03 ^c	141.26±5.06 ^d	161.29±3.70 ^e
Iron	2.46±0.05 ^a	4.74±0.02 ^b	3.35±0.06 ^c	6.75±0.15 ^d	9.18±0.21 ^e
Zinc	1.43±0.03 ^a	2.17±0.04 ^b	1.95±0.04 ^a	2.34±0.05 ^b	3.20±0.08 ^c

Data are expressed as mean ± SEM of three determinations. Values in the same row with different superscript are significant different (P<0.05).

Key: B1: Digestive biscuit from unprocessed Reyna – 28 wheat

B2: Digestive biscuit from processed Reyna – 28 wheat

B3: Digestive biscuit from unprocessed Norman wheat

B 4: Digestive biscuit from processed Norman wheat

Control: Commercial digestive biscuit (Mcvities digestive biscuit)

CONCLUSION AND RECOMMENDATION(S): The study showed that digestive biscuit produced from 100% Reyna-28 wheat flour (B2) was comparable to the commercial digestive biscuit in terms of functional properties, mineral composition and sensory evaluation, and hence, can be produced locally at home and reduce cost.

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OD36

A bread produced from Carrot, Fermented Maize and Tiger Nut Residue Flour Blends for food security.

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KEYWORDS: Bread, maize residue, tiger-nut residue, nutrient composition

BACKGROUND AND OBJECTIVE:

The bakery industry is one of the large growing food industries in the world, increased consumption of bakery products prepared from refined wheat flour is attributed to rising health challenges, which has led to the demand for healthier alternatives [1]. This study aimed to produce and evaluate the nutritional content of bread using carrot, fermented maize and tiger nut residue flour blend as a measure of enhancing food and nutrition security.

MATERIALS AND METHODS:

The raw materials (carrot, tiger-nut and yellow maize) were purchased from local retailers at Ori-Ugba Market in Umuhia Abia State. Three (3kg) residue flour each of maize and tiger nut were washed, fermented, milled and sieved. The blanched carrots (in order to maintain the colour during the drying process), were grated, oven dried, milled and sieved to obtain a fine carrot flour. Three composite flours were formulated and the bread preparation method was adapted from the FAO cereals production toolkit. These groups were analyzed for nutrient and anti-nutrient/phytochemical composition using AOAC procedures. Data obtained were statistically tested for mean difference (ANOVA) and separation (Duncan multiple range test) using IBM SPSS Version 23, P was considered significant at <0.05.

RESULTS

Bread made from wheat, maize residue and carrot flour (BWMC) and bread made from wheat, maize

residue, tiger nut residue and carrot flour (BWMTc) had the least moisture contents (24.6-26.34%), the protein was comparatively higher in bread made from wheat, tiger nut residue and carrot flour (BWTC) (9.56%) and BWMTc (8.94%). Fat (13.32%), dietary fiber (2.40%), ash (2.58%) and energy value (348.23%) were highest in BWMC. BWMC and BWMTc respectively recorded the highest mineral and vitamin composition amongst the samples. Anti-nutrient levels were within the acceptable limit. The result of the sensory properties showed that there was no significant difference in the appearance and taste of 100% wheat bread and BWMC. Apart from the 100% wheat bread, BWMC recorded the second highest sensory attributes. BWTC and BWMTc had the least general acceptability. Study findings are supported by previous literature where incorporation of flours from plant residue/peels in bread/confectionaries production offered similar nutritive value with added therapeutic benefits to the normal products [2-4].

Table 1. Nutrient composition of the samples

Sample/treatment	BW (control)	BWTC	BWMC	BWMTc
Moisture (%)	28.44 ^a ± 0.06	27.09 ^b ± 0.02	24.64 ^d ± 0.08	26.34 ^c ± 0.03
Protein (%)	7.87 ^d ± 0.04	9.56 ^a ± 0.06	8.46 ^c ± 0.06	8.94 ^b ± 0.03
Fat (%)	4.42 ^d ± 1.00	11.71 ^b ± 1.00	13.32 ^a ± 0.02	11.16 ^c ± 0.01
Dietary Fiber (%)	1.08 ^d ± 0.03	1.94 ^b ± 0.03	2.40 ^a ± 0.04	1.65 ^c ± 0.03
Ash (%)	1.92 ^c ± 1.00	2.03 ^b ± 1.00	2.58 ^a ± 0.02	2.53 ^a ± 0.02
Carbohydrate (%)	56.27 ^a ± 1.00	47.68 ^d ± 1.00	48.61 ^c ± 0.13	49.39 ^b ± 0.02
Energy (kcal)	296.38 ^c ± 1.00	334.39 ^b ± 0.48	348.23 ^a ± 0.16	333.74 ^b ± 0.31
Calcium	24.06 ^c ± 0.65	26.79 ^a ± 0.01	25.52 ^b ± 0.14	23.77 ^c ± 0.42
Magnesium	18.84 ^d ± 0.08	19.80 ^b ± 0.03	19.60 ^c ± 0.03	21.56 ^a ± 0.06
Phosphorus	30.73 ^b ± 0.11	32.46 ^a ± 0.06	32.87 ^a ± 0.04	32.22 ^a ± 0.88
Carotenoid (ug/100g)	2.94 ^d ± 0.03	10.64 ^c ± 0.04	15.41 ^a ± 0.01	11.57 ^b ± 0.02
Vitamin B1 (mg/100g)	0.80 ^c ± 0.03	0.97 ^a ± 0.02	0.88 ^b ± 0.02	0.92 ^{ab} ± 0.02
Vitamin B2 (mg/100g)	0.08 ^c ± 0.02	0.23 ^b ± 0.03	0.08 ^c ± 0.01	0.37 ^a ± 0.04
Vitamin B3 (mg/100g)	0.55 ^c ± 0.21	0.77 ^b ± 0.03	0.73 ^b ± 0.04	0.94 ^a ± 0.03
Vitamin C (mg/100g)	26.76 ^d ± 0.28	32.17 ^c ± 0.02	34.40 ^b ± 0.02	37.82 ^a ± 0.03

Results are mean ± standard deviation of mineral scores.

Mean on the same column with different superscripts are significantly different ($p \leq 0.05$)

*Key: BW (control) = 100% bread from wheat flour

BWTC = 50% wheat flour, 30% tiger nut residue flour, 20% carrot flour

BWMC = 50% wheat flour, 30% maize residue flour, 20% carrot flour

BWMTc = 40% wheat flour, 20% maize residue flour,

20% tiger nut residue flour, 20% carrot flour

CONCLUSION AND RECOMMENDATION

The fermented maize residue-only blend (BWMC) showed better proximate, micronutrient composition and organoleptic acceptance than other samples. The addition of fermented maize residue, fermented tiger nut residue and carrot improved the nutritional value of bread as seen in the increase in dietary fibre, carotenoid and other nutrients. This provides a healthy alternative for persons suffering from obesity, diabetes and vitamin A disorder. The incorporation of fermented maize and tiger nut residues and carrot presents a high economic and health potential in the bakery industry as it will curb wastage and reduce risk of non-communicable diseases

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Nutrient and Sensory Attributes of puff-puff Produced from Composite Flour of yellow Cassava, Orange flesh sweet potato and Sesame seed

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KEYWORDS: puff-puff, Yellow cassava, Orange flesh sweet potato, Sesame seed

Background of the study

Puff-puff is one of Nigeria's most popular snacks sold and consumed. It is a nutritive food obtained from single or composite dough that has been transformed into digestible and more appetizing products through heat via deep frying with hot fat [1]. They are regarded as confectioner food with low moisture content (2). It's a traditional African snack made of fried dough. They are made of dough containing flour, yeast, sugar, salt, water, and deep fried in vegetable oil to a golden-brown color. Puff pastry is a bakery product containing a high-fat content (3). Due to increased demand for functional products, attempts are being made to improve snack nutritional value and functionality by modifying their recipes. Nigeria is experiencing a high cost of wheat due to the huge expenditure of foreign exchange, leading to the high cost of flour in the country. Hence the need to produce puff-puff by partial replacement of the wheat flour. Therefore, the study investigated the nutrient and sensory attributes of puff-puff produced from the partial replacement of wheat flour with yellow cassava, orange flesh potato flour and sesame seed.

Materials and method

Orange flesh sweet potato, yellow cassava and sesame seed were processed into flour, and the flours were combined in different proportions to obtain composite flours: (6:2:1:1 for sample WYOSF₁), (WYOSF₂ = 5:3:1:1), (WYOSF₃ = 4:4:1:1), and commercial wheat flour was used as control. Puff-puff was deep fried using the composite flours. Using the standards method, samples were subjected to chemical, instrumental (4) and panelists evaluated the puff-puff for colour, taste, aroma, flavour and general acceptability using the nine (9) - point hedonic scale, where the highest score was 9, and 1 was the least score (5). Analysis of variance using Statistical Package for Social Science (SPSS) version 23 was performed. Significance was accepted at P<0.05.

Results

Table 1 result shows that sample WYOSF₃ significantly (p<0.05) had the highest value of moisture (15.21%) while sample WHTF (13.61%) had the least value. The value (2.52%) obtained for ash in WYOSF₁ was significantly (p<0.05) different other samples including the control. The ash content decreases with a reduction in the quantity of yellow cassava flour used to produce the puff-puff. In the same vein, the fibre content of the samples shows that WYOSF₁, WYOSF₂, WYOSF₃ and WHTF had 6.67%, 5.58%, 3.73% and 3.24%, respectively. WYOSF₁ significantly (p<0.05) had the highest value of sodium (306.mg/100g), followed by sample WYOSF₂ (278mg/100g), while sample WHTF (248mg/100g) revealed the least value for the sodium content of the puff-puff. The control sample had the highest value of calcium (212mg/100g). K, Mg, and Z decreases with decrease in the quantity of yellow cassava flour and significant (p<0.05) difference was recorded in their values. All the vitamins were significantly (p<0.05) decreases with reduction in the percentage proportion of yellow cassava flour used in the production of

the puff-puff. Beta-carotene content of the puff-puff was significantly ($p < 0.05$) higher in the composite puff-puff than the control sample (Table 2). The result of the mean sensory scores is presented in Table 4. The scores for overall acceptability and colour varied from 5.80-8.47 and 4.93-8.25 respectively. The result revealed that the flavour and aroma of the puff-puff varied significantly ($P < 0.05$) between the (control) sample WHTF which is 100% wheat flour and the other samples WYOSF₁ to WYOSF₃ incorporated with yellow cassava and orange flesh sweet potato flours. In general, all the puff-puff samples compared well with the control sample, and were well accepted table (2).

Conclusion

The study has shown that WYOSF₁ could be used as wheat substitute to produce puff-puff that would be accepted by consumed in terms of nutritional composition. The puff-puff produced from 60% Yellow cassava flour, 20% orange flesh sweet potato, 10% sesame seed, 10% wheat flour had increased nutrients of carbohydrate, fibre, fat, and ash, including vitamins and mineral content. The study had shown that a nutritious and acceptable puff-puff could be produced with partial replacement of wheat flour with yellow cassava and orange flesh sweet potato flours

Table 1: Proximate Mineral and Vitamin composition of puff-puff produced

Proximate	WYOSF ₁	WYOSF ₂	WYOSF ₃	WHTF
Moisture (%)	14.66±0.007 ^b	14.52±0.012 ^b	15.21±0.016 ^a	13.61±0.016 ^d
Ash (%)	2.52±0.006 ^a	2.19±0.009 ^c	2.23±0.002 ^b	1.94±0.012 ^d
Fat (%)	12.89±0.021 ^b	12.85±0.16 ^{bc}	12.32±0.021 ^d	15.15±0.000 ^a
Fibre (%)	6.67±0.001 ^a	5.58±0.006 ^b	3.72±0.002 ^c	3.24±0.007 ^{cd}
Protein (%)	14.25±0.014 ^a	13.18±0.021 ^b	11.37±0.026 ^c	10.12±0.009 ^d
CHO (%)	49.05±0.047	51.75±0.023	55.16±0.036	55.90±0.003
Minerals				
Na (mg/100g)	306.10±0.141 ^a	278.40±0.212 ^b	259.70±0.212 ^c	248.50±0.141 ^d
Ca (mg/100g)	191.40±0.000 ^c	204.70±0.212 ^a	178.70±0.707 ^d	212.40±0.141 ^b
K (mg/100g)	610.70±0.141 ^b	585.30±0.424 ^d	591.70±0.141 ^c	660.10±0.212 ^a
Zinc (mg/100g)	1.37±0.006 ^a	1.23±0.004 ^b	0.83±0.022 ^c	0.62±0.005 ^d
Mg (mg/100g)	46.12±0.035 ^a	33.97±0.009 ^b	27.19±0.014 ^d	30.26±0.001 ^c
Se (mg/100g)	0.17±0.003 ^c	0.21±0.004 ^a	0.20±0.002 ^{ab}	0.14±0.004 ^d
Fe (mg/100g)	0.22±0.002 ^a	0.19±0.004 ^b	0.16±0.002 ^c	0.14±0.006 ^d
Cu (mg/100g)	0.11±0.004 ^d	0.21±0.004 ^c	0.26±0.004 ^b	0.30±0.001 ^a
P (mg/100g)	59.13±0.002 ^a	56.76±0.018 ^b	45.43±0.001 ^c	37.27±0.002 ^d
Iodine (µg/100g)	7.14±0.004 ^a	5.22±0.006 ^c	6.19±0.004 ^b	5.05±0.038 ^{cd}
Vitamins				
Beta carotene (mcg)	15.55±0.20 ^a	13.45±0.34 ^b	11.89±0.21 ^c	8.67±0.67 ^d
B1 (mg/100g)	28.65±0.005 ^a	25.41±0.003 ^b	21.96±0.014 ^c	15.60±0.002 ^d
B2 (mg/100g)	0.52±0.049 ^a	0.47±0.005 ^b	0.45±0.002 ^c	0.03±0.002 ^d
B3 (mg/100g)	1.73±0.004 ^a	1.62±0.002 ^b	1.37±0.007 ^c	1.15±0.011 ^d
B5 (mg/100g)	0.17±0.004 ^a	0.13±0.002 ^b	0.12±0.001 ^c	0.11±0.001 ^d
B6 (mg/100g)	0.31±0.002 ^a	0.28±0.003 ^b	0.24±0.004 ^c	0.19±0.004 ^d
B9 (mcg/100g)	95.65±0.212 ^a	82.85±0.212 ^b	80.26±0.212 ^c	71.25±0.02 ^d

Values are mean ± standard deviation of duplicate analyses. Values with the same superscript in the same columns are statistically insignificant ($P < 0.05$). Key: WYOSF₁ = 60% Yellow cassava flour, 20% orange flesh sweet potato, 10% sesame seed, 10% wheat flour, WYOSF₂ = 50% Yellow cassava flour, 30% orange flesh sweet potato, 10% sesame seed, 10% wheat flour, WYOSF₃ = 40% Yellow cassava flour, 40% orange flesh sweet potato, 10% sesame seed, 10% wheat flour, WHTF = 100% Wheat flour

Table 2: Sensory Evaluation of the Puff-puff

Sensory attributes	WYOSF ₁	WYOSF ₂	WYOSF ₃	WHTF
Flavour	6.07±0.632 ^d	6.47±2.799 ^b	6.20±1.494 ^c	8.33±1.174 ^a
Aroma	6.40±0.632 ^b	5.60±1.430 ^d	6.13±1.853 ^c	8.33±1.989 ^a
Mouth feel	5.60±0.699 ^d	5.30±1.636 ^c	6.20±1.838 ^b	8.27±2.201 ^a
Taste	5.87±0.949 ^d	6.00±1.494 ^{bc}	6.07±2.163 ^b	8.27±1.080 ^{az}
Colour	4.93±1.687 ^b	4.67±2.058 ^{bc}	4.60±2.541 ^{cd}	8.25±2.506 ^{az}
Overall acceptability	5.80±1.370 ^c	5.40±1.252 ^d	6.07±1.160 ^b	8.47±1.059 ^a

Values are mean ± standard deviation of duplicate analyses. Values with the same superscript in the same columns are statistically insignificant (P<0.05). Key: WYOSF₁= 60% Yellow cassava flour, 20% orange flesh sweet potato, 10% sesame seed, 10% wheat flour, WYOSF₂= 50% Yellow cassava flour, 30% orange flesh sweet potato, 10% sesame seed, 10% wheat flour, WYOSF₃= 40% Yellow cassava flour, 40% orange flesh sweet potato, 10% sesame seed, 10% wheat flour, WHTF = 100% Wheat flour

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Functional, Nutritional Composition and sensory attribute of Cocoa Based Beverage Produced from Cocoa beans, Soybean, Sorghum leaves and Date fruit

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KEYWORDS: Cocoa beverage, date fruit, soybeans, selenium, protein

INTRODUCTION

The recent elevation of diet-related non communicable diseases as shown the urgent need of releasing nutrient content of popular food among Nigerian. The major strategy for prevention and treatment of NCDs is lifestyle modification, including controlled diet and physical activities (1, 2). Developing countries are faced with the challenge of diet related diseases like diabetes mellitus, cancer, cardiovascular diseases and triple burden of malnutrition (3,4). Beverages are liquid foods that serve as a source of both fluids, nutrients and provide energy for daily manual work that refresh and nourish the body (5). With the rise in cost of commercial cocoa beverages nationwide, it is pertinent to produced alternative cocoa beverages that can supply nutrients for the nourishment of the body devoid of refined sugar as against the usual sugar dense commercial beverage in market which is a risk factor for non-communicable diseases. The potential of cocoa beans, soybean, sorghum leaves and date fruit in beverage production as well as the nutritional and sensory characteristics of the processed beverage was investigated

MATERIALS AND METHOD

The cocoa was purchased from Okunriboye Merchant company while Soybean, Sorghum leaf and date fruit were procured from King's Market in Owo Local Government Area of Ondo State respectively. The ingredients were formulated into ratio to obtain composite flours (CSDS₁, 70% Cocoa beans; 20% Soybean ; 5% date fruit; 5% sorghum leaves, (CSDS₂ = 60% Cocoa beans; 25% Soybean ; 10% date fruit; 5% sorghum leaves (CSDS₃ = 50% Cocoa beans; 30% Soybean ; 15% date fruit; 5% sorghum leaves, CSDS₄ = 40% Cocoa beans; 35% Soybean ; 20% date fruit; 5% sorghum leaves. Commercial cocoa-based beverage was used as control (CCBB). Samples were evaluated for functional, nutritional composition and sensory characteristics according to standard (AOAC, 2012). The results were expressed as mean \pm standard deviation and the test for statistical significance was carried out using one-way analysis of variance (ANOVA). The Statistical Package for Social Sciences (SPSS, Version 20) software was used to determine significant differences at ($p < 0.05$).

RESULTS

Findings show that sample CSDS₂ (12.02%) was significantly higher in moisture content, significantly ($p < 0.05$). The ash content of the samples increases significantly ($p < 0.05$) with the decrease in the quantity of cocoa in the formulation. Sample CSDS₄ had the highest (3.49%) ash content. The fat content decreases with the reduction in the percentage of cocoa bean used in the formulation. Sample CSDS₁ with highest

percentage of cocoa seed had 16.24g of fat which is the highest and it was significant ($p < 0.05$) compared to other samples. Fibre content of the cocoa beverage was low in all the samples while the protein content of the beverage increases with increase in the amount of soybean ratio in the formulation. In terms of mineral content, Sample CSDS₂ was significantly difference ($p < 0.05$) from other samples and contained the highest value of sodium (228mg/100g) calcium (117mg/100g) and potassium (503mg/100g) content while magnesium was significantly ($p < 0.05$) higher in sample CSDS₁ (26.35mg/100g) while CSDS₂ had the least value (22.47mg). Sample B had the highest value for phosphorus content (81mg), while sample CSDS₃ had the least value (72mg/100g). The vitamin content of the samples revealed that vitamin B₁ (17.91 mg/100g), Vitamin B₂ (0.14mg/100g), Vitamin B₃ (2.61 mg/100g), folic acid and (217mcg/100g) and pantothenic acid (0.31mg/100g) were significantly ($p < 0.05$) higher in sample CSDS₂. (Table 1). Functional properties revealed that water absorption capacity (35.5%) and swelling capacity (53.2%) were significantly ($p < 0.05$) higher in sample CSDS₂ while Oil absorption capacity (14.7%) and Least gelation capacity (1.25%) were significantly ($p < 0.05$) higher in sample CSDS₃ and CSDS₄ respectively. (Table 2)

CONCLUSION

In conclusion, the four formulated beverages had appreciable amount of Protein, fat, sodium, potassium, phosphorus, selenium, zinc and thiamin. But was low in carbohydrate when compared with the commercial product.

Table 1: Nutrient composition of beverage produce from cocoa beans, Soybean, date fruit and sorghum leave flour

Nutrients	Samples code				
	CSDS ₁	CSDS ₂	CSDS ₃	CSDS ₄	CCBB
Proximate g/100g					
Moisture (%)	11.15±.042 ^c	12.02±.021 ^a	11.37±.028 ^b	11.08±.028 ^c	ND
Ash (%)	2.80±.012 ^d	3.41±.004 ^c	3.46±.002 ^b	3.49±.009 ^a	ND
Fat (%)	16.24±.004 ^a	15.56±.007 ^b	11.16±.016 ^d	12.29±.002 ^c	6.40
Fibre (%)	2.04±.019 ^c	1.95±.012 ^d	2.18±.010 ^a	2.15±.010 ^b	3.10
Protein (%)	8.63±.019 ^d	8.81±.003 ^c	10.76±.001 ^b	10.93±.011 ^a	8.10
CHO (%)	59.11±.060 ^c	56.93±.034 ^d	61.40±.038 ^a	60.03±.021 ^b	76.0
Mineral (mg/100g)					
Na (mg/100g)	216.30±0.141 ^b	228.50±0.282 ^a	194.90±0.141 ^d	203.50±0.141 ^c	110.0
Ca (mg/100g)	135.70±0.282 ^c	177.50±0.424 ^a	120.55±0.070 ^d	150.60±.282 ^b	900.0
K (mg/100g)	503.60±0.141 ^a	479.85±0.353 ^c	435.30±0.141 ^d	489.95±0.353 ^b	ND
Zn (mg/100g)	2.17±0.002 ^b	2.41± 0.004 ^a	1.95±0.010 ^d	2.15±0.005 ^c	11.30
Mg (mg/100g)	30.91±0.004 ^a	27.64±0.003 ^c	25.98±0.007 ^d	28.53±0.002 ^b	ND
Se (mcg/100g)	49.00±0.002 ^d	50.00±0.005 ^c	54.00±0.004 ^a	52.00±0.004 ^b	45.00
Fe (mg/100g)	2.06±0.012 ^a	1.71±0.007 ^c	1.91±0.004 ^b	1.52±0.009 ^d	16.50
Cu (mg/100g)	0.24±0.005 ^c	0.28±0.007 ^b	0.31±0.002 ^a	0.31±0.005 ^a	ND
P (mg/100g)	77.30±0.002 ^c	81.56± 0.004 ^a	72.45± 0.005 ^d	79.50±0.002 ^b	ND
Iodine (mg/100g)	4.17±0.002 ^b	4.32±0.014 ^a	3.68±0.014 ^c	3.42±0.007 ^d	ND
Vitamins					
B1 (mg/100g)	15.73± 0.005 ^b	17.91±0.003 ^a	15.52±0.014 ^c	14.68±0.002 ^d	1.90
B ₂ (mg/100g)	0.11±0.049 ^b	0.14±0.005 ^a	0.09 ±0.002 ^c	0.10 ±0.002 ^b	2.10
B ₃ (mg/100g)	2.16±0.004 ^b	2.61±0.002 ^a	1.91±0.007 ^d	2.10±0.011 ^c	25.0
B ₅ (mg/100g)	0.27±0.004 ^b	0.31± 0.002 ^a	0.23±0.001 ^d	0.25±0.001 ^c	12.5
B ₆ (mg/100g)	0.19±0.002 ^c	0.22±0.003 ^a	0.17±0.004 ^d	0.20±0.004 ^b	1.50
B ₉ (mcg/100g)	210.45±0.212 ^b	217.05±0.212 ^a	203.55±0.212 ^d	208.40±0.02 ^c	0.30
Vit C (mg/100g)	35.00±0.216 ^a	31.00±0.112 ^a	34.00±0.312 ^a	32.00±0.232 ^a	50.0

Values are mean ± standard deviation of duplicate analyses. Values with the same superscript in the same columns are statistically not significant at ($P < 0.05$). **Key;** CSDS₁ =, 70% Cocoa beans; 20% Soybean; 5% date fruit; 5% sorghum leaves CSDS₂ = 60% beans; 25% Soybean; 10% date fruit; 5% sorghum leaves CSDS₃ = 50% Cocoa beans; 30% Soybean; 15% date fruit; 5% sorghum leaves, CSDS₄ = 40% Cocoa beans; 35% Soybean; 20% date fruit; 5% sorghum leaves, ND= Not determine

Table 2: Functional Properties Of Beverages Produce From Cocoa, Sorghum Leave, Soybean And Date Fruit

Parameters	CSDS ₁	CSDS ₂	CSDS ₃	CSDS ₄
Water absorption capacity (%)	35.55±0.11 ^a	30.17±0.04 ^b	20.76±0.03 ^c	30.16±0.05 ^b
Oil absorption capacity (%)	14.78±0.03 ^b	12.52±0.01 ^d	24.18±0.02 ^a	13.42±0.03 ^c
Swelling capacity (%)	53.24±0.02 ^a	40.46±0.08 ^b	16.68±0.18 ^c	13.94±0.3 ^d
Least gelation capacity (g)	1.25±0.07 ^d	2.30±0.14 ^c	2.85±0.71 ^b	3.20±0.00 ^a
Bulk density (g/ml)	0.45±0.00 ^d	0.51±0.01 ^b	0.49±0.00 ^c	0.52±0.00 ^a

Values are mean ± standard deviation of duplicate analyses. Values with the same superscript in the same columns are statistically not significant at (P<0.05). **Key;** CSDS₁ =, 70% Cocoa beans; 20% Soybean; 5% date fruit; 5% sorghum leaves CSDS₂ = 60% beans; 25% Soybean; 10% date fruit; 5% sorghum leaves CSDS₃ = 50% Cocoa beans; 30% Soybean; 15% date fruit; 5% sorghum leaves, CSDS₄ = 40% Cocoa beans; 35% Soybean; 20% date fruit; 5% sorghum leaves

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Nutrient composition and sensory properties of tofu coagulated with tamarind and exposed to different heat treatments.

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KEYWORDS: Tofu, Nutrient, anti-nutrient, tamarind.

BACKGROUND AND OBJECTIVE:

Tofu is an inexpensive, nutritious, healthy meat/cheese substitute with bland taste and porous texture made from soybean. This study was designed to determine the nutrient, anti-nutrient and mineral properties of tofu coagulated with tamarind exposed to different heat treatments.

MATERIALS AND METHODS:

The soybean seed and tamarind fruits used for the study were purchased from Ahiaeke market in Umuahia North Local Government Area of Abia State. Soybean was soaked overnight, washed, milled and filtered to obtain the milk, which was boiled, coagulated with tamarind and exposed to different methods of cooking. The tofu preparation method has been described elsewhere (1). Chemical composition and sensory evaluation of the samples were determined using standard methods/procedures and compared with the control (deep fried chicken). Data were subjected to analysis of variance (ANOVA) to compare the means. All analysis were done using IBM SPSS version 25. Differences were considered significant at $p < 0.05$.

RESULTS

Cooking reduced the moisture content of tofu from 82.47% in fresh tofu (ax) to 20.49% in the baked tofu (cx), but increased other nutrient contents - crude protein (8.02% to 10.72%), fat (4.74% in ax to 14.47% in fried tofu, dx), ash (ax - 0.97% to 2.76% steamed tofu, bx), crude fiber (0.91% in ax to 1.11% in cx), carbohydrate (3.67% in ax to 59.70% in cx) and energy/calorie (89.39kcal/100g in ax to 378.50kcal/100g in dx). Mineral contents such as calcium (105.23-101.85mg/100g), iron (8.71 to 6.90mg/100g), magnesium (108.03 to 98.84mg/100g), potassium (69.90 to 60.58 mg/100g) and sodium (3.10 to 2.66mg/100g) decreased upon heating. Processing reduced the anti-nutrient composition of the samples. The sensory evaluation showed that microwaved tofu (ex) was preferred in terms of aroma, texture and general acceptability while dx and cx recorded the highest colour and taste rating. These findings strengthens the evidence available in the literature that tofu is an adequate, healthier and affordable alternative to addressing protein energy malnutrition and food insecurity (2, 3).

CONCLUSION

Cooking increased the macronutrients but decreased the mineral and anti-nutrient contents of tofu. The consumption of tofu should be encouraged because of its high nutrient composition and several health benefits associated with it. Food industries should find ways of processing and packaging tofu in order to make them more convenient and appealing comparable with the control.

RECOMMENDATION

The low sodium makes tofu a veritable food to be included in sodium regulated diets of at-risk patients.

Table 1. Proximate composition of tofu

Tofu	Moisture %	Crude Protein %	Fat %	Ash %	Crude Fiber %	Carbohydrates %	Energy kcal/100g
Fresh (ax)	82.47	8.02	4.74	0.97	0.91	3.67	89.39
Steamed (bx)	30.28	9.87	5.17	2.76	1.03	50.97	290.10
Baked (cx)	20.49	10.72	5.51	2.50	1.11	59.70	331.30
Fried (dx)	20.51	10.62	14.47	1.82	0.96	51.45	378.50
Microwaved (ex)	26.23	9.71	5.40	1.61	0.90	56.15	311.95

Values represent mean of triplicate readings.

Table 2. Mineral contents of tofu (mg/100g)

Tofu	Ca	Fe	Mg	K	Na	Phytate	Oxalate	Tannin	Saponin	Phenol
Fresh (ax)	105.23	8.71	108.03	69.90	3.10	0.94	0.72	1.47	0.64	1.01
Steamed (bx)	104.54	8.02	107.34	69.23	3.01	0.70	0.63	1.35	0.64	0.89
Baked (cx)	104.07	6.90	100.92	65.80	2.80	0.65	0.54	0.86	0.32	1.64
Fried (dx)	101.85	6.73	98.84	60.58	2.66	0.52	0.43	0.71	0.47	1.52
Micro-waved (ex)	104.83	7.70	105.75	68.48	2.93	0.81	0.65	1.31	0.54	0.78

Values represent mean of triplicate readings.

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Evaluation of proximate, minerals and functional properties Complementary Foods Prepared from Germinated Millet (*Pennisetum glaucum* L) with Groundnut (*Arachis hypogaea* D) and *Moringa oleifera* Flour Blends

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KEYWORDS: Germination, Millet, Protein, Functional Properties

BACKGROUND AND OBJECTIVE:

Malnutrition has been associated with feeding infants with poor quality weaning foods. Evidence has shown that the combination two or more plant-based food materials in formulation of complementary foods improves the nutritional quality (1). This study determined the proximate, mineral and functional properties blends prepared from germinated millet, groundnut and *Moringa oleifera*.

MATERIALS AND METHODOLOGY: Seven blends were formulated using Nutri-Survey for Linear Programming Software and compared with Ogi and cerelac. The complementary blends were formulated from different ratio of blends (50:35:15, 50:30:20, 55:25:20, 60:20:20, 70:10:20, 55:20:25, 55:15:30) of germinated millet, groundnut and *M. Oleifera*. The proximate, minerals and functional properties were determined using standard methods of analysis (1). Data were analyzed using statistical packages, mean(s) values were separated using Duncan's New Multiple Range (DNMR) test at $P < 0.05$

RESULT AND DISCUSSION: The protein content of the formulated diets differed significantly ($p < 0.05$) and values ranged from 18.09 ± 0.03 g/100 g (GMGM1) to 23.54 ± 0.03 g/100 g (GMGM3). The protein contents in the formulated foods were relatively high and met the recommended dietary intake of > 16 for infant up to one year (2). The high protein value observed could be attributed to the germination of millet. The results of this work was higher than 15.2-17.00 g/100 g reported by Adeoti and Osundahunsi, (3) for maize-based complementary food enriched with germinated *Moringa Oleifera* seed flour. For the mineral compositions (mg/kg), there was significant difference ($p < 0.05$) in the mineral composition of the formulated and control diets. Minerals such as iron (1.24 - 1.46 mg/kg) and Zinc (0.29 - 0.39 mg/kg) were found to be present in appreciable quantities. The molar ratio of Na/K and Ca/P ranged from 0.23 to 0.27 and 1.31 to 1.36 respectively. Therefore, the formulated diets met the recommended values of < 1 and > 0.5 for both Na/K and Ca/P molar ratio respectively. The bulk densities of the diet ranged from 0.68 to 0.72 g/mL while the water absorption and swelling capacities of the samples were 10.83 to 20.26 % and 1.53 to 2.45 % respectively. The results of the functional properties showed that except for bulk density the formulated foods were significantly ($p < 0.05$) lower than the control sample (Cerelac). This result is similar to the finding of Ijarotimi, (2), who reported low functional properties for maize based complementary foods. The overall acceptability of the formulated complementary foods ranged from 5.45 to 6.25 and were

significantly ($p < 0.05$) rated lower than in control samples (Cerelac). The variation observed could be attributed to the familiarity of the panelists to the control sample. However, among the formulated complementary foods, GMGM3 (6.25) was the most preferred followed by GMGM5 (6.15) and GMGM4 (6.05) respectively.

CONCLUSION AND RECOMMENDATION : The formulated complementary foods exhibited high protein, energy and minerals content this therefore implies that they can promote growth and can be recommended for children of weaning age.

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Table 1 Proximate (g/100g) and mineral composition (mg/Kg) of formulated complementary food from germinated millet, groundnut and Moringa Oleifera blends

Nutrient	GMGM 1	GMGM 2	GMGM3	GMGM 4	GMGM 5	GMGM 6	GMGM 7	CERELAC	OGI
Moisture	7.27 ^b ±0.15	7.33 ^b ±0.09	6.03 ^d ±0.03	6.60 ^c ±0.10	6.10 ^d ±0.06	6.03 ^d ±0.03	5.07 ^e ±0.07	4.03 ^e ±0.01	7.80 ^{ab} ±0.12
Total Ash	2.29 ^b ±0.09	2.65 ^a ±0.03	2.20 ^b ±0.03	2.22 ^b ±0.03	1.70 ^c ±0.10	2.15 ^b ±0.03	2.24 ^b ±0.07	2.51 ^b ±0.01	1.18 ^{±0.01}
Crude Fat	19.56 ^b ±0.06	12.29 ^f ±0.07	18.32 ^c ±0.07	18.20 ^d ±0.07	20.81 ^e ±0.03	16.62 ^e ±0.03	16.38 ^e ±0.03	9.87 ^f ±0.01	5.61 ^g ±0.01
Crude Protein	18.09 ^e ±0.03	20.07 ^c ±0.03	23.54 ^d ±0.03	18.46 ^d ±0.17	23.43 ^e ±0.03	23.47 ^e ±0.03	21.50 ^b ±0.03	17.36 ^c ±0.01	7.08 ^d ±0.12
Crude Fibre	3.50 ^{de} ±0.07	3.54 ^e ±0.06	3.72 ^{cd} ±0.06	3.73 ^{cde} ±0.033	3.72 ^{cd} ±0.06	3.79 ^e ±0.03 ^c	4.34 ^b ±0.03	5.43 ^a ±0.12	0.92 ^e ±0.01
Carbohydrate	56.16 ^f ±0.15	61.07 ^c ±0.100	52.15 ^h ±0.03	57.81 ^d ±0.29	50.21 ^l ±0.15	53.90 ^g ±0.33	55.44 ^e ±0.12	69.11 ^b ±0.12	86.28 ^d ±0.12
Energy(kcal)	473.04 ^b ±0.99	435.17 ^f ±0.77	467.64 ^b ±0.33	468.88 ^c ±0.44	481.85 ^a ±0.52	459.06 ^d ±0.26	455.18 ^d ±0.61	434.71 ^e ±0.61	423.93 ^e ±1.03
Na	1.80 ^b ±0.0	1.90 ^e ±0.0	1.80 ^b ±0.0	1.60 ^d ±0.0	1.60 ^d ±0.0	1.90 ^e ±0.00	1.70 ^c ±0.0	1.45 ^e ±0.1	0.15 ^f ±0.0
K	7.34 ^a ±0.0	7.25 ^b ±0.0	7.07 ^d ±0.0	6.87 ^f ±0.0	6.81 ^g ±0.0	7.15 ^c ±0.0	6.97 ^e ±0.0	6.37 ^h ±1.5	1.03 ⁱ ±0.2
P	2.97 ^a ±0.0	2.90 ^{ab} ±0.0	2.77 ^{abc} ±0.0	2.70 ^{abc} ±0.0	2.61 ^c ±0.0	2.86 ^{ab} ±0.0	2.73 ^{bc} ±0.0	4.00 ^{±0.1}	0.86 ^{±0.02}
Ca	3.90 ^b ±0.0	3.83 ^b ±0.0	3.71 ^b ±0.0	3.58 ^b ±0.0	3.55 ^b ±0.0	3.77 ^b ±0.0	3.65 ^b ±0.0	6.00 ^{±0.0}	0.69 ^{±0.02}
Mg	0.32 ^a ±0.0	0.31 ^{±0.0}	0.30 ^{bc} ±0.0	0.28 ^{cd} ±0.0	2.76 ^d ±0.0	3.06 ^{ab} ±0.0	2.88 ^{cd} ±0.0	-	2.75 ^d ±0.01
Zn	0.39 ^b ±0.02	0.38 ^c ±0.0	0.35 ^e ±0.0	0.32 ^g ±0.0	0.29 ^h ±0.0	0.36 ^d ±0.0	0.33 ^f ±0.0	0.50 ^{±0.0}	0.08 ^{±0.01}
Fe	1.46 ^a ±0.0	1.42 ^b ±0.0	1.35 ^d ±0.0	1.28 ^{7f} ±0.0	1.24 ^g ±0.0	1.38 ^{±0.0}	1.32 ^{±0.0}	0.75 ^h ±0.0	0.03 ^{±0.0}
Cu	0.12 ^b ±0.01	0.11 ^c ±0.02	0.10 ^d ±0.01	0.09 ^e ±0.0	0.08 ^f ±0.0	0.11 ^{±0.0}	0.09 ^{de} ±0.0	-	0.13 ^{±0.02}
Mn	0.17 ^b ±0.02	0.16 ^c ±0.02	0.15 ^d ±0.02	0.13 ^f ±0.0	0.13 ^f ±0.0	0.16 ^{±0.0}	0.14 ^{±0.0}	-	0.20 ^{±0.02}
Na/K	0.25	0.26	0.25	0.23	0.23	0.27	0.24	0.23	0.14
Ca/P	1.31	1.32	1.34	1.33	1.36	1.32	1.34	1.5	0.8

Means (±SEM) with different alphabetical superscripts in the same row are significantly different at p<0.0550%Germinated Millet +35%Groundnut + 15%Moringa oleifera, GMGM2: 50%GerminatedMillet +30%Groundnut + 20%Moringa oleifera, GMGM3: 55%Germinated Millet +25%Groundnut +20%Moringa oleifera; GMGM4: 60%Germinated Millet +20%Groundnut + 20%Moringa oleifera, GMGM570%Germinated Millet +10%Groundnut + 20%Moringa oleifera, GMGM6: 55% Germinated Millet +20% Groundnut + 25%Moringa oleifera GMGM7: 55%Germinated Millet +15%Groundnut + 30%Moringa oleifera

Food consumption Pattern of under-five Children Attending Pediatric Outpatient Department of Federal Medical Centre (FMC) Abeokuta, Ogun state

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KEYWORDS: Food consumption, under five children

BACKGROUND AND OBJECTIVE:

Food consumption patterns early in life modulates the child's future health trajectory and his/her susceptibility for the development of adult-onset chronic diseases [1]. Despite the significance of dietary adequacy during this window of opportunity, information on food frequency pattern amongst infants and young children remain scarce. This study therefore assessed the socio-demographic characteristics and food frequency pattern of foods.

METHODOLOGY: A descriptive cross-sectional survey of 158 respondents was carried out in the Pediatric Outpatient Department of Federal Medical Centre Abeokuta, Ogun state on children under the age of five years who were given informed consent. The data were collected using semi-structured questionnaire which was administered to obtain necessary information from the parents or caregivers of the respondents which included the socio-demographic characteristics and food frequency pattern. The data gathered by the questionnaire was analyzed using SPSS for descriptive and inferential statistics.

RESULTS AND DISCUSSION: The study showed the food frequency consumption pattern of the respondents. It is evident that 13% of respondents consume millet and oat everyday by 13.9% of respondents. Milk accounted for highest 62% consumed dairy on daily basis. This finding is not in tandem with Henry-Unaeze [2] who find consumption of milk and milk products to be very low. Beans were the most frequently ingested pulse. Also, 54% of the respondents eats eggs every day and 19% of respondents consumed banana and orange daily.

CONCLUSION:

The study identified food consumption pattern among the subjects which showed high consumption of milk, maize, beef, chicken, eggs, fruits and vegetables. It is recommended that the mothers should encourage to keep up with the good consumption pattern. (Conclusion not suitable, no recommendation)

Table 1: Food frequency pattern of respondents

Variables	Frequency(%)			
	Never	Daily	1-3 times per week	4-6 times per week
Dairy product				
Milk	3(1.9)	98(62.0)	34(21.5)	23(14.6)
Cereals and grains				
Maize	56(35.4)	26(16.5)	65(41.1)	11(7.0)
Millet	69(43.7)	21(13.3)	60(38.0)	8(5.0)
Oat	74(46.8)	22(13.9)	45(28.5)	17(10.80)
Wheat	56(35.4)	11(7.0)	78(49.4)	13(8.2)
Custard	56(35.4)	25(15.8)	65(41.1)	12(7.6)
Pap	17(10.8)	51(32.3)	54(34.2)	36(22.8)
Pulses and legumes				
Soya bean	54(34.2)	14(8.9)	84(53.2)	6(3.8)
Tofu	132(83.5)	5(3.2)	17(10.8)	4(2.5)
Kidney Beans	117(74.1)	2(1.3)	26(16.5)	13(8.2)
Beans	19(12.0)	20(12.7)	90(57.0)	29(18.4)
Cashew Nut	121(76.6)	1(0.6)	29(18.4)	7(4.4)
Bambara	123(77.8)	6(3.8)	22(13.9)	7(4.4)
Groundnut				
Vegetables				
Ewedu	22(13.9)	47(29.7)	69(43.7)	20(12.7)
Efo	49(31.0)	13(8.2)	84(53.2)	12(7.6)
Tete	81(51.3)	6(3.8)	66(41.8)	5(3.2)
Bell-Peppers	68(43.0)	41(25.9)	35(22.2)	14(8.9)
Carrot	57(36.1)	17(10.8)	66(41.8)	18(11.4)
Tomatoes	29(18.4)	69(43.7)	42(26.6)	18(11.4)
Fruits				
Orange	13(8.2)	30(19.0)	91(57.6)	24(15.2)
Watermelon	21(13.3)	22(13.9)	86(54.4)	29(18.4)
Pineapple	61(38.6)	8(5.1)	73(46.2)	16(10.1)
Paw-Paw	74(46.8)	9(5.7)	58(36.7)	17(10.8)
Banana	19(12.0)	30(19.0)	87(55.1)	22(13.9)
Meat and poultry				
Beef	46(29.1)	19(12.0)	83(52.5)	10(6.3)
Chicken	46(29.1)	10(6.3)	91(57.6)	11(7.0)
Turkey	58(36.7)	8(5.1)	78(49.4)	14(8.9)
Eggs	6(3.8)	86(54.4)	47(29.7)	19(12.0)

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Effects of domestic food processing methods on proximate composition of Six Mungbean (*Vigna radiata*) flours, Mungbean and Cowpea porridge.

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Key words: Mungbean, , Processing, Proximate Composition

BACKGROUND AND OBJECTIVE

Mungbean, a lesser known legume, very nutritious, could be processed into flours and plucked as needed for home recipes to prevent many cellular and cardiovascular diseases.

The study investigated the effects of domestic food processing method on proximate composition of six mungbean flours and porridges.

MATERIALS AND METHOD:

Mungbean seeds, purchased from Micheal Okpala University of Agriculture Umudike, Abia State, Nigeria. Cowpea, from Eke Awka Main Market Awka, Anambra State Nigeria. Two thousand four hundred kilogrammes of mungbean seeds were weighed out and divided into six equal parts, processed as follows: Dehulled shade dried (DSH), dehulled sun-dried (DSU), fermented, twenty-four hours (F24), fermented, forty-eight hours (F48), sprouted, seven days (SP7) and undehulled shade dried (UDSH), as control. Four hundred grammes of undehulled mungbean seeds were soaked in three volumes of cold water, boiled for three minutes, brought down, kept for 65 minutes prior to cooking as porridge, Cowpea porridge was used as control. Analysis of variance (ANOVA) was used to analyze data, Duncan's new multiple range test adopted to separate.

RESULTS AND DISCUSSION

The DSH, DSU and F24 samples had higher protein values (32.44, 32.24 and 32.02%, each) relative to the other samples. This showed they were better processing methods to improve mungbean protein. The control (UDSH), F48, SP7 samples had similar but lower protein values (26.22, 25.98 and 25.67%, each). These were comparable to those obtained by (Sgarbieri, 19995; Mubarak, 2005; Khalil and Khan, 1995; Akpapunam 1996) (22.96, 27.50, 23.1 and 23.6%, respectively), this confirmed that mungbean could be comparable to any animal protein. Bennick (1995) reported that appropriate combination of beans and cereals consumed in adequate amounts will prevent protein-energy malnutrition (PEM).

The difference between f24 and f48 sample values showed the superiority of shorter fermentation period over longer fermentation time. The UDSH and SP7 samples had similar low fat values (2.03 and 2.15%, each). The other samples had similar lower values that ranged from (1.74 to 1.91%). This showed that they will keep longer without rancidity relative to the SP7 and UDSH. Higher fat content of food lowers its chance to keep long. The lower fat content has health and nutrition implication as excesses of protein and CHO in our diets are stored in the body as fat. Secondly most of daily diets have fats or oil incorporated in them during preparation. These fat excesses could result in unhealthy fat deposits (Plaque) on the coronary

arteries.

UDSH and DSH had similar ash the higher ash values (3.99 to 4.41) showed the processes were able to release more ash (mineral) from their organics complexes in mungbean then the F24. The UDSH had highest fibre (4.42%). This value was comparable to those of DSU, F24, F48, SP7 samples (4.42, 4.33, 4.04 and 4.10%, respectively). The DSH had the least (3.76%) fibre. Fibre forms dietary bulk that reduces caloric intake and dietary obesity, increasing bowel movement thereby reducing cancer virus survival. Carbohydrate (CHO) values ranged from 50.57 to 57.05%. The F48 and SP7 had higher values (57.05 and 56.48%) (CHO). The other four samples had comparable CHO (51.67, 50.82, 50.66 and 50.57%, each). The porridge of undehulled mungbean seeds (UDM) had higher moisture, protein, ash and fibre values (68.30, 10.95, 2.25 and 3.90%) relative to those of cowpea (62.20, 9.85, 1.75 and 0.30, respectively). Cowpea had higher fat (2.80) and (11.80), respectively relative to the mungbean values (see Table 2)

See Table 1

Table 1: Effects of processing on Proximate Composition of Six Mungbean Flours (dry weight %)

Samples	Protein	Fat	Ash	Fibre	CHO
UDSH	26.22 ^b	2.03 ^a	3.99 ^b	4.42 ^a	51.67 ^c
DSH	32.44 ^a	1.88 ^b	3.99 ^b	3.76 ^b	50.82 ^c
DSU	32.24 ^a	1.91 ^b	4.27 ^a	4.24 ^a	50.66 ^c
F24	32.02 ^a	1.75 ^b	3.74 ^b	4.33 ^a	50.57 ^c
F48	25.98 ^b	1.74 ^b	3.85 ^b	4.04 ^a	57.05 ^b
SP7	25.67 ^b	2.15 ^a	4.41 ^a	4.10 ^a	56.48 ^b

Means in the same column with different superscript letters differed (P,0.05)

UDSH = Control, Undehulled and shade dried mungbean, DSH = Dehulled and shade dried mungbean, DSU = Dehulled, sundried mungbean F24 = 24h fermented mungbean F48 = 48h fermented mungbean ,SP7 = 7days sprouted mungbean

Table 2: Effects of Domestic Food Processing (Cooking) On Proximate Composition Mungbean and Cowpea Porridges:

Porridge	Rate(%)	Moisture	Protein	Fat	Ash	Fibre	CHO
UDM	100	68.30 ^a	10.95 ^a	2.80 ^b	2.25 ^a	3.90 ^a	11.80 ^b
CP	100	62.20 ^b	9.85 ^b	2.90 ^a	1.75 ^b	0.30 ^b	32.90 ^a

Means in the same column with varied superscripts differed (P,0.05).

UDM = Undehulled mungbean

CP = Cowpea

CONCLUSION AND RECOMMENDATION

The DSU, DSH, F24 were very high in protein, all the processing methods reduced fat levels, ash content were increased with DSU and SP7 while F48 and SP7 yielded higher CHO values. All the methods resulted in very good nutrient quality for different groups of people.

Nutritionists, dieticians and other should apply the domestic food processing method in mungbean preparation to increase their nutrients and promote good health for clients.

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Food Consumption Pattern of Under-Five (6-59) Months Old Children Attending Infant Welfare Clinics in Federal Medical Centre, Abeokuta, Ogun State

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KEYWORDS: Food consumption, under five children, Socio-demographic.

BACKGROUND AND OBJECTIVE

Early food consumption patterns may affect a child's future health trajectory and susceptibility to developing chronic diseases that manifest in adulthood. Despite the importance of eating a balanced diet during this window of opportunity, research on dietary intakes in infants and young children is still limited (1). The Objective of this study is to assess the socio-demographic characteristics of the children and assess their food consumption pattern.

METHODOLOGY

A descriptive cross-sectional survey of 145 respondents was carried out at the Infant Welfare Clinic of the Federal Medical Centre (FMC) Abeokuta, Ogun state on children under the age of five who were given informed consent. Data were collected using a semi structured questionnaire which was administered to obtain the necessary information from the parents or caregivers of the respondents on the socio-demographic characteristics and food frequency pattern. The data gathered by the questionnaire was analyzed using SPSS for descriptive and inferential statistics.

RESULT AND DISCUSSION

A total of 145 respondents participated in the study, 53.8% were males and 46.2% were females. Majority of the respondents were of the Yoruba ethnic group.

Table 1: Socio- Demographic Characteristics of the Repondents

Variables	Frequency	Percentage (%)
Gender		
Male	78	53.8
Female	67	46.2
Ethnicity		
Yoruba	112	77.2
Igbo	23	15.9
Hausa	7	4.8
Others	3	2.1
Marital status		
Single	2	1.4
Married	135	93.1
Divorced	3	2.1
Separated	5	3.4
Total	145	100

The food consumption pattern of respondents is shown in the table below in which the frequency of the dairy product consumption was found to be 46.2%, 24.1% for daily consumers and 4-6 times consumers respectively. Meats and Poultry was also consumed by the respondents, 35.2% of the respondents consumed meat 1-3 times in a week.

Table 2: Food Consumption Pattern of Respondents

Variables	Frequency			
	Never	Daily	1-3 times daily	4-6 times daily
DAIRY PRODUCT				
Milk	6(4.1)	67(46.2)	37(25.5)	35(24.1)
CEREAL AND GRAIN				
Millet	61(42.1)	16(11.0)	56(38.6)	12(8.3)
Oat	86(59.3)	11(7.6)	31(21.4)	17(11.7)
Wheat	68(46.9)	13(9.0)	53(36.6)	11(7.6)
Pap	9(6.2)	59(40.2)	47(32.4)	30(20.7)
Maize	58(40.0)	22(15.2)	57(39.3)	8(5.5)
PULSES AND LEGUMES				
Soya bean	51(35.2)	23(15.9)	63(43.4)	5(5.5)
Tofu	123(84.8)	2(1.4)	17(11.7)	3(2.1)
Bambara Groundnut	127(87.6)	6(4.1)	11(7.6)	1(0.7)
Beans	19(13.1)	29(20.0)	74(51.0)	23(15.9)
Cashew Nut	105(72.4)	4(2.8)	28(19.3)	8(5.5)
VEGETABLES				
Bitter Leaf	110(75.9)	4(2.8)	21(14.5)	10(6.9)
Ugu	71(49.0)	12(8.3)	48(33.1)	14(9.7)
Ewedu	26(17.9)	32(22.1)	52(35.9)	35(24.1)
Efo	47(32.4)	19(13.1)	63(43.4)	16(11.1)
Tete	63(43.4)	13(9.0)	57(39.3)	12(8.3)
FRUITS				
Orange	14(9.7)	49(33.8)	63(43.4)	19(13.1)
Watermelon	18(12.4)	34(23.4)	67(46.2)	26(17.9)
Pineapple	55(37.9)	21(14.5)	50(34.5)	19(13.1)
Banana	36(24.8)	22(15.2)	64(44.1)	23(15.9)
Paw-Paw	72(49.7)	24(16.6)	37(25.5)	12(8.3)
MEAT AND POULTRY				
Chicken	48(33.1)	13(9.0)	65(44.8)	19(13.1)
Turkey	77(53.1)	11(7.6)	45(31.0)	12(8.3)
Eggs	17(11.7)	59(40.7)	39(26.9)	30(20.7)

CONCLUSION AND RECOMMENDATION

The consumption of soya bean, milk, fruits, vegetables, meat and poultry is high among respondents. The consumption pattern is good but there is still room for improvement in the children's food consumption pattern.

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Determination of Fatty Acid Profile of Selected Fish Species Consumed in Akwa Ibom State, Nigeria.

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KEYWORDS: *Clarias Gariepinus*; Linoleic acid; Linolenic acid and Eicosapentanoic acid

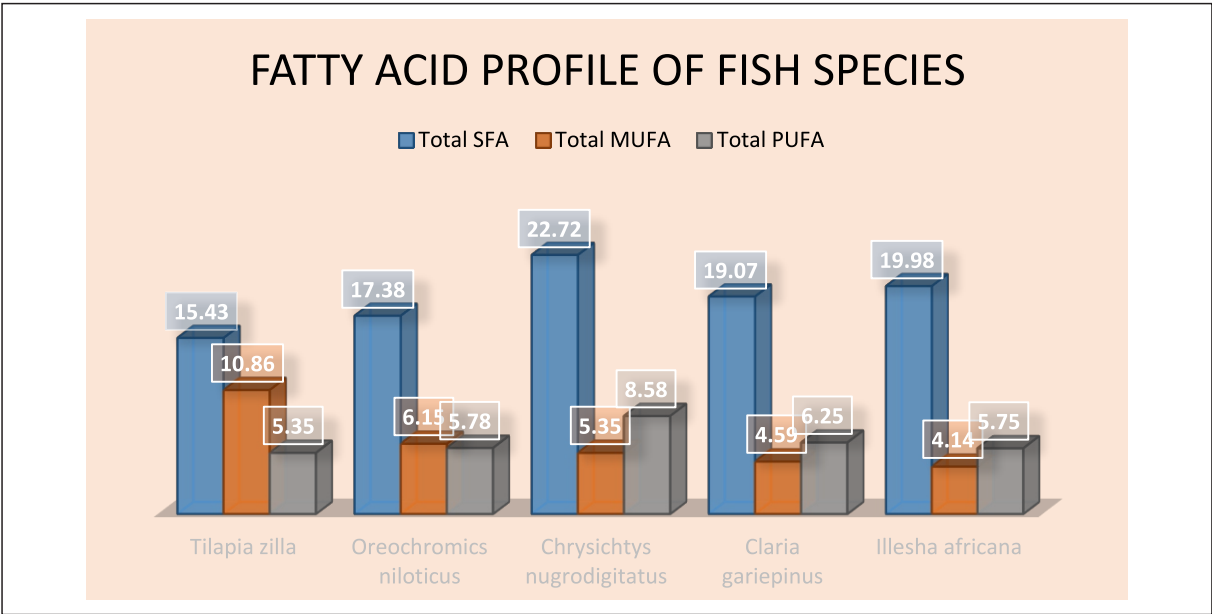
BACKGROUND AND OBJECTIVE:

Fish is an excellent source of vital dietary components, especially dietary proteins, fat soluble vitamins and polyunsaturated fatty acids (PUFAs). The PUFAs are particularly known for their health benefits with regards to preventing cardiovascular diseases and other diet related chronic conditions. The fatty acid profiles (FAPs) of fish has been studied extensively (1,2), however, like in all other food items, these are most likely to vary depending on the diversity or species. The FAPs of the vast species of fish identified in the fresh water bodies and consumed within Akwa Ibom State have not been well documented. This study was designed to determine the FAPs in selected fish species consumed in Akwa Ibom State.

MATERIALS AND METHOD: Fresh fish samples of *Clarias Gariepinus*, *Oreochromis Niloticus*, *Tilapia Zilli*, *Chrysichthys Nigrodigitatus* and *Illesha Africana* were obtained from two fish landing sites located in Ibeno and Ikpa Rivers in Akwa Ibom State, Nigeria. A total of ten individual specie samples, five from each fish landing sites were obtained. Each fish type was properly identified, trimmed, cleaned, minced, homogenized and oven dried at 50°C for twelve hours prior to analyses. The FAPs were determined using the gas chromatography (model 7890A Agilent, USA) with flame- ionization Detector (FID). Fatty acid contents were expressed as percentage total saturated (SFA), monounsaturated fatty acids (MUFAs) and PUFAs of the total content of all fatty acids in the samples.

RESULTS AND DISCUSSION: Findings from the study revealed the dominant 3 PUFAs with their ranges as linolenic acid (2.45 ± 0.02 and 0.3 ± 0.01), followed by eicosapentaenoic (1.49 ± 0.01 and 0.23 ± 0.01), and then docosapentaenoic (0.45 ± 0.03 and 0.23 ± 0.01). The recorded 6 PUFAs and their ranges were linolenic (2.45 ± 0.02) and arachidonic acids (0.23 ± 0.01). In terms of individual composition, *Chrysichthys Nigrodigitatus* had comparatively the highest value (8.58) of total PUFA while tilapia recorded the least (5.35). Generally, the percentage of fatty acids varied widely among the considered fish species, ranging from 15.40% to 19.95% (SFAs); 4.23% to 9.88% (MUFAs) and 2.65% to 8.58% (PUFAs). Among them, those occurring in higher proportions were palmitic acid (C16:0; 3.38-10.69%) as SFAs; oleic acid (C18:1; 3.38-6.1%) as MUFAs and linolenic acid (C22:6n-3; 1.66-4.72%) as PUFAs. It was also observed that the proportion of these fatty acids changed significantly between species ($p < 0.05$).

CONCLUSION: Fishes from the fresh waters in Akwa Ibom State are considerably good sources of both MUFAs and PUFAs. Their consumption should be encouraged as a means of attaining good nutrition that guarantees cardiovascular health.



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Meal Pattern And Micro Nutrient Adequacy Of Food Consumed By Secondary School Female Adolescents In Ibadan

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KEYWORDS: Meal pattern, Micronutrients adequacy, Female adolescents

BACKGROUND AND OBJECTIVE:

Adolescents have high nutritional needs but usually engage in unhealthy eating behaviors especially skipping of breakfast which has a significant impact on their health in adulthood. Balanced nutrition is crucial for adolescent's proper physical and mental development. Dietary habits change significantly with a child's development. Along with increasing age and the shift towards adolescence, unhealthy diet-related habits become more common.¹ Micronutrients are essential throughout the life but the period of childhood and adolescence is more important, as it is marked by rapid growth and development. This study assessed meal pattern and micro-nutrient adequacy of food consumed by secondary school female adolescents in Ibadan.

MATERIALS AND METHOD: A cross-sectional descriptive study design was conducted among female adolescents in selected secondary schools in two Local Government Areas in Ibadan, Oyo state. A total of 384 respondents were used, using a proportionate random sampling technique, a semi-structured questionnaire was used to collect socio demographic data, 24-hours dietary recall and food frequency questionnaire was used to collect information on meal pattern and food intake from respondents. Data was analyzed using descriptive statistics to analyze the demographic factors, Total Dietary Assessment was used to analyze the 24-hours dietary recall and Chi-square was used to determine the association between meal pattern and micronutrient adequacy, with level of significance set at ($p < 0.05$).

RESULTS AND DISCUSSION: More than half 57.8% of the female respondents were between the ages of 13-15 years, 62.5% of them ate thrice a day, a similar research conducted among female adolescents in Delta State, reported 56.70% which is quite similar.² The study revealed that 60.2% of the respondents skip meals of which lunch was mostly skipped. This is consistent with the report of a study in IlaOrangun on meal pattern of adolescents that showed that more of the respondents consumed both breakfast and dinner compared to lunch.³ This study revealed that Calcium is the most deficient of all the micronutrient (338.3mg mean intake) which means 26.02% in respect to RDA percentage fulfilment. A similar study showed that the majority, (65.2%) of the adolescent girls had substantially inadequate calcium intake.⁴ Vitamin B6, Zinc and Iron were found to meet the RDA.

CONCLUSION AND RECOMMENDATION

According to this study, it can be noted that majority of the adolescents skip meals and many of them are deficient of one micronutrient or the other. It is therefore important that special strategies should be implemented to improve the nutritional status of female adolescents.

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OD46

Evaluation of Nutritional and Sensory Qualities of Biscuit Produced from Flour Blends of Wheat, Pigeon Pea and Carrot.

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KEYWORDS: Sensory qualities, Nutritional qualities, biscuit, malnutrition

BACKGROUND AND OBJECTIVE:

Protein–energy malnutrition (PEM) is still a major public health issue in developing countries. It is associated with as much as 50–60% of under-five mortality in poor countries and a myriad of morbidities [1]. Call for a strategic development to use less expensive local raw crops in the production of staple foods is being promoted by organizations like WHO, FAO and the United Nations refugee feeding programs, This led to the initiation of the composite flour programs, The aim is to replace as much wheat in baked goods as possible with flour, starch, minerals and protein concentrates from local crops [2]. Hence, this study is designed to evaluate the proximate composition, vitamins and sensory properties of cookies produced from wheat flour enriched with pigeon pea flour and carrot flour.

MATERIALS AND METHODS: Simplex lattice design for two component mixtures expended with internal points constraints (X1:60%-90%, X2:10%-40%), was used to investigate flour mixtures composed of wheat

flour (X1), pigeon pea flour (X2) and equal proportion of carrot flour, as independent variables on nutritional and sensory attributes of the snacks made from these mixtures as dependent variables. A total of six combinations used on the constraints was generated as follows: (WH₇₅PP₂₅C₂₀, WH₆₇PP₃₃C₂₀, WH₉₀PP₁₀C₂₀, WH₆₀PP₄₀C₂₀, WH₈₂PP₁₈C₂₀, WH₉₀PP₁₀C₂₀). Proximate composition of the flours was determined using AOAC, 2012 methods. Carbohydrate content was determined by difference. The titration method of AOAC (2012) method was used to determine the vitamin C content, Spectrophotometric Method was used in the determination of Beta-Carotene. Sensory evaluation of the biscuits was carried out with 29 semi-trained panelists comprising of students and members of academic staff in nutrition and Dietetics Department, Federal University of Agriculture Abeokuta, Ogun- State, Questionnaire describing the quality attributes (colour, crispiness, taste, flavor and overall acceptability) of the cookies was given to individual panelist to evaluate using a 9-point hedonic scale. Data was subjected to Analysis of Variance and significant means were separated using Duncan multiple range test ($p < 0.05$).

RESULTS AND DISCUSSION: The proximate and vitamins content of the biscuit produced from wheat, pigeon pea and carrot flour blends. The moisture, crude protein, crude fibre, total ash, crude fat and carbohydrate content of the biscuit sample ranged from 7.02g/100g-10.20g/100g, 11.49g/100g-16.29g/100g, 2.10g/100g-2.75g/100g, 2.27g/100g-2.49g/100g, 19.97g/100g-26.55g/100g, 42.08g/100g-52.74g/100g respectively. The vitamin c and beta carotene content ranged from 27.38mg/100g-36.06mg/100g, 0.72ug/100g-0.91ug/100g respectively. There are significant ($p < 0.001$) difference in the proximate, vitamins content of the biscuit sample except fibre. The crude protein, crude fibre, total ash of the biscuit was observed to increase this can be attributed to the presence of the pigeon pea flour this agreed with the findings by [2].

SENSORY CHARACTERISTICS OF BISCUIT PRODUCED FROM WHEAT FLOUR, PIGEON PEA FLOUR, CARROT FLOUR BLENDS: The sensory attributes of the biscuit sample ranged from: (texture) 5.10 to 6.86, (thickness) 5.03 ± 1.66 - 6.90 ± 1.29 , (mouthfeel) 4.31-6.79, (colour) 6.10-7.10, (flavour) 4.55-7.31, (aroma) 4.76-7.03, (overall acceptability) 5.03-7.38 respectively. Sample WH₉₀PP₁₀C₂₀ had the highest acceptability while sample WH₆₀PP₄₀C₂₀ had the lowest acceptability. There are significant ($p < 0.001$) difference in the the sensory attributes of the biscuit samples except colour. The texture, thickness, mouthfeel, flavour, aroma and overall acceptability of the biscuits decrease with increase in the amount of pigeon pea level this agreed with the findings by [2].

CONCLUSION AND RECOMMENDATIONS:

This study has shown the potential of developing proteineous and vitamin A-rich biscuits. More research should also be carried out on how to improve the acceptability of "pigeon pea", when put into other use.

Experimental runs	Moisture	Crude protein		Crude fibre	Total ash	Carbohydrate	Vitamin c	Beta carotene		Vitamin A, umg, RAE
		Crude fat	Crude					Vitamin c	Beta carotene	
WH ₇₅ PP ₂₅ C ₂₀	7.33 ^d ±0.23	14.12 ^c ±0.04	22.95 ^c ±0.02	2.19 ^a ±0.03	2.39 ^b ±0.00	51.04 ^c ±0.25	36.06 ^a ±0.03	0.75 ^{bc} ±0.00	125.25	
WH ₆₇ PP ₃₃ C ₂₀	7.02 ^d ±0.07	15.02 ^b ±0.08	24.58 ^b ±0.39	2.23 ^b ±0.03	2.44 ^a ±0.02	48.71 ^d ±0.18	30.29 ^d ±0.10	0.89 ^a ±0.00	148.63	
WH ₆₀ PP ₄₀ C ₂₀	8.24 ^c ±0.13	12.09 ^a ±0.02	23.67 ^c ±0.04	2.37 ^a ±0.04	2.34 ^a ±0.03	51.69 ^b ±0.12	35.04 ^b ±0.11	0.79 ^a ±0.00	143.62	
WH ₆₀ PP ₄₀ C ₂₀	10.20 ^a ±0.03	16.29 ^a ±0.04	26.55 ^a ±0.49	2.40 ^a ±0.04	2.49 ^a ±0.03	42.08 ^e ±0.44	27.38 ^e ±0.13	0.91 ^a ±0.01	151.97	
WH ₆₂ PP ₃₈ C ₂₀	9.69 ^b ±0.06	13.15 ^a ±0.00	19.97 ^d ±0.47	2.10 ^a ±0.03	2.35 ^b ±0.01	52.74 ^a ±0.37	31.75 ^c ±0.05	0.72 ^c ±0.00	120.24	
WH ₆₀ PP ₄₀ C ₂₀	7.92 ^c ±0.47	11.49 ^a ±0.04	24.29 ^c ±0.30	2.75 ^a ±0.01	2.27 ^b ±0.01	51.60 ^b ±0.71	34.20 ^b ±0.04	0.73 ^b ±0.00	121.91	
	P<0.001	P<0.001	P<0.001	NS	P<0.001	P<0.001	P<0.001	P<0.001		

Values are means ± S.D of duplicate determinations. Values in the same column with different superscripts were significantly (p<0.001) different

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OD47

Nigerian Food Composition Table: need to compile version 2

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KEYWORDS: Foods, Nutrients, Food composition

BACKGROUND AND OBJECTIVE:

In the year 2017, during the annual meeting of Nutrition Society of Nigeria, a Nigerian Food Composition Table was released. It was developed after a long consultative process with key stakeholders in the Nigerian food composition workspace. Energy and twenty-five (25) nutrients were compiled for two hundred and eighty (280) commonly consumed foods in Nigeria [1]. A book version and an online database were released for public use. Compared to Nigeria's diversity of single foods, ingredients and mixed dishes, the first version is not sufficient. This abstract provides a justification for a revised and updated version of Nigeria's Food Composition Table.

MATERIALS AND METHODS: The revision and update to the first version will adapt the methods prescribed by the FAO/INFOODS's compilation tool. In this new version, consideration will be given to new features which include calculation of nutrient composition for common mixed dishes and recipes, also compilation of food labelling as reported on branded food items. Additional nutrients in food relevant to public health will also be compiled for use in the new version. A consultative approach will also be deployed as applied in the first version.

CONCLUSION: The need for an updated version of the Nigerian Food Composition Table cannot be over emphasized. Food data to make this upgrade a success is solicited by the Principal Investigator. Potential funders are also being sought to generously support the development of this crucial tool which will be a useful resource for all professionals in the Nutrition community.

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SUB-THEME E: NEW APPROACHES IN NUTRITION RESEARCH

OE1

Polyphenol content, antioxidant activity, physical and sensory properties of functional cake made from wheat-maize composite flours enriched with cocoa (*Theobroma cacao*) powder

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KEYWORDS: Phenolic compounds, antioxidant capacity, cocoa powder, proximate

Introduction

Phenolic compounds have been confirmed to have numerous biological significances, including antioxidant property, antimutagenic, antitumor, and antibacterial activities¹. Antioxidant properties of natural polyphenols stimulate antioxidant enzymes, reduce-tocopherol radicals, and block oxidases, resulting in positive health consequences. Cocoa powder is a plant product that has not enjoyed wide consumer acceptance in Nigeria as a result of its bitter aftertaste and astringency. Cocoa powder has been reported to confer health-promoting benefits including promotion of cardiovascular health, reduction of low-density lipoprotein (LDL) cholesterol and oxidation of LDL to prevent atherosclerosis or plaque formation and this is because it have been reported to exhibit greater antioxidant capacity than many other flavanol-rich foods including blueberry, garlic and strawberry. The study is therefore design to evaluate the proximate and antioxidant properties of cake made from the blends of flours enriched with cocoa powder.

Material and Methods

Processing of maize flour

Cleaning and sorting of the maize grains was done using standard method. The grains were dried in a cabinet dryer at 50 °C for 6 h. Allowed to cool, milled and packaged in air-tight containers at room temperature until further use.

Production of cake from wheat-maize Composite Flour enriched with cocoa powder

Control cakes sample were prepared with wheat flour. The enriched cakes were prepared using the same method (**W₉₀M₅C₅**, **W₈₀M₁₀C₁₀**, **W₇₀M₁₅C₁₅**, **W₆₀M₂₀C₂₀** and **W₅₀M₂₅C₂₅**). All Different cakes formula were baked using standard method.

Chemical analysis

Determination of the antioxidant activity, total phenols and total flavonoids of cake from wheat-maize enriched with cocoa powder

The method² was used to assess the 1,1-diphenyl-2-picrylhydrazyl (DPPH) scavenging activity, total phenol and total flavonoid content of the cakes.

Results and Discussions

The proximate composition of the cakes is presented in Table 1. Protein content of the cakes ranged from 10.98 to 14.78 % for (WHT₁₀₀) and (W₅₀M₂₅C₂₅). The increase in protein may be due to high protein found in wheat-maize

flour and cocoa powder. The DPPH and total phenol content ranged from 14.00 to 21.89 % and 1.02 to 4.10 mg/g GAE for (WHT₁₀₀) and (W₅₀M₂₅C₂₅), respectively as shown in Table 2. The DPPH of the cake samples increased with the increasing level of cocoa flour. Antioxidant are chemical substance that acts as oxidation inhibitors and as such inhibit the production of free radicals, hence play a key role in preventing oxidation stress which results to generation of chronic diseases like diabetes, obesity, hypertension and cancers³.

Table 1. Proximate composition (%) of the composite of the enriched cakes

Samples	Moisture	Fat	Protein	Fibre	Ash	Carbohydrate
W ₉₀ M ₅ C ₅	8.86 ^e ±0.01	19.28 ^b ±0.12	12.45 ^e ±0.11	4.12 ^e ±0.02	3.49 ^e ±0.01	51.80 ^e ±0.02
W ₈₀ M ₁₀ C ₁₀	9.10 ^d ±0.03	15.89 ^c ±0.13	12.67 ^d ±0.12	4.56 ^d ±0.01	3.56 ^d ±0.02	54.22 ^b ±0.03
W ₇₀ M ₁₅ C ₁₅	10.11 ^c ±0.02	13.48 ^d ±0.14	13.33 ^c ±0.11	4.89 ^c ±0.03	4.45 ^c ±0.03	53.74 ^c ±0.03
W ₆₀ M ₂₀ C ₂₀	11.21 ^b ±0.01	12.18 ^e ±0.12	14.15 ^b ±0.12	5.01 ^b ±0.01	4.78 ^b ±0.02	52.67 ^d ±0.02
W ₅₀ M ₂₅ C ₂₅	11.45 ^a ±0.01	12.02 ^f ±0.01	14.78 ^a ±0.01	6.17 ^a ±0.03	4.99 ^a ±0.03	50.59 ^f ±0.03
WHT	5.71 ^f ±0.03	23.23 ^a ±0.01	10.98 ^f ±0.03	2.01 ^f ±0.03	2.22 ^f ±0.01	55.85 ^a ±0.02

Mean (±)Values with different alphabetical superscripts in a column differ (P > 0.05) significantly

Table 2. DPPH, Total phenols and Total flavonoids content of the enriched cakes

Samples	DPPH (%)	Total phenols (mg/g/GAE)	Total flavonoids (mg/QE/g)
W ₉₀ M ₅ C ₅	15.67 ^e ±0.02	2.45 ^e ±0.04	1.28 ^e ±0.02
W ₈₀ M ₁₀ C ₁₀	17.76 ^d ±0.03	3.56 ^d ±0.01	1.38 ^d ±0.01
W ₇₀ M ₁₅ C ₁₅	19.33 ^c ±0.02	3.78 ^c ±0.04	1.89 ^c ±0.02
W ₆₀ M ₂₀ C ₂₀	21.39 ^b ±0.01	3.89 ^b ±0.03	1.99 ^b ±0.01
W ₅₀ M ₂₅ C ₂₅	21.89 ^a ±0.03	4.10 ^a ±0.02	2.08 ^a ±0.02
WHT	14.00 ^f ±0.04	1.02 ^f ±0.02	1.12 ^f ±0.02

Mean (±)Values with different alphabetical superscripts in a column differ (P > 0.05) significantly

Knowledge and Perception of Undergraduate Students towards Nutrigenomics for Personalized Nutrition in Federal University of Agriculture, Abeokuta, Ogun State.

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KEYWORDS: Nutrigenomics, Personalized Nutrition, Knowledge, Perception.

BACKGROUND AND OBJECTIVES:

Nutrigenomics is a scientific study of the molecular interaction between genes and nutrients. Personalized Nutrition is the practice of adapting the diet to meet specific nutritional needs or prevent chronic disease in individuals or genetic subgroups based on the results of genetic testing (1). College students, who are educated and more familiar with new technology, may provide valuable information about perceptions toward nutrigenomics technology while it is still in its early stages of development (3). Few studies have examined how college students perceive the possibility of targeted recommendations based on their genetic make-up. Many companies are now offering personalized dietary advice based on the results of genetic testing. The purpose of this study was to examine the knowledge and perception of undergraduate students towards nutrigenomics for personalized nutrition.

MATERIALS AND METHOD:

Participants in this study were students from the Federal University of Agriculture, Abeokuta Ogun state who completed a paper survey questionnaire administered. A multistage sampling technique was used to select 400 respondents for the study. Analyses of results were completed using the Statistical Package for Social Sciences (SPSS) version 24. Independent sample t-tests were conducted comparing the mean scores of genetics knowledge and nutrigenomics perception among gender groups, and groups who may either be familiar with nutrigenomics for personalized nutrition therapy or not. Pearson correlation coefficients were calculated for the relationship between genetics knowledge scores and perception of nutrigenomics scores. ANOVA were being used to determine whether there are differences in genetics knowledge and perceptions toward nutrigenomics among groups of different class levels and different colleges.

RESULTS AND DISCUSSION

Participants ranged from 18 to 35 years old with a mean age of 21.17 years (n= 305). Study reveal that more than half (61.3%) of the respondents were females, most of them were between the ages of 18 and 23 years accounting for 81%. The study result shows that 56% (n=223) has knowledge about nutrigenomics. Based on survey results, a negative correlation was found, $r(398) = -0.037$, $p \leq 0.461$, indicating a non-significant negative linear relationship between positive perceptions toward nutrigenomic testing and higher genetics knowledge scores. About 63% reported some familiarity with nutrigenomic testing. Overall, participants indicated stronger

agreement with positive statements regarding nutrigenomic testing, while they agreed less with negative statements. Some previous studies have suggested support for genetic testing (Wilkins, 2017), but many of these are not specific to the use of nutrigenomics in nutrition care. There was a significant effect for students who indicated participation in a college-level genetics course, ($p = 0.04$). However, due to multiple barriers, and especially excessive cost to consumers, public support of "omics" technology is not appreciable.

CONCLUSION AND RECOMMENDATION:

In conclusion, the study revealed that public support for the "omics" technology is unclear due to several obstacles and in particular excessive costs for it to work effectively here in Nigeria. The study shows that university student under study has little knowledge about nutrigenomics and there are lot of research to be done in order to increase public support of nutrigenomics. However, the study call for more researches to be carried out to accurately ascertain the knowledge and perception of nutrigenomics for personalized nutrition therapy among students, healthcare professionals, public and all prospective user of nutrigenomics.

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PE3

Assessment of Nutritional Knowledge, Dietary Habits and Oral Health Practices of Undergraduate Students in Lead City University Ibadan, Nigeria

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KEYWORDS: Dietary Habits, Nutrition Knowledge, Oral health practice, Undergraduates

Background and Objectives: Nutrition is an essential component of oral health. Young adults and adolescents in Nigeria are mostly at risk of dental caries and periodontal diseases due to excessive intake of sugar-sweetened foods and beverages (1, 2). Adequate nutritional knowledge is fundamental to healthy dietary behavior and consequently oral health practices (OHP). The study therefore assessed the nutritional knowledge, dietary habits and oral health practices of undergraduate students in Lead City University Ibadan.

Materials & Methodology: A descriptive design using random sampling technique was used to select 314 respondents. Nutrition knowledge and OHP were assessed using questionnaire while dietary habit of consumption of cariogenic foods in the preceding seven days was assessed using Food frequency questionnaire. Nutrition knowledge was scored on a scale of 11 and categorised as good (7-11), fair (5-6) and poor (<5) while OHP was scored on a scale of 8 and categorised as good (5-8) and poor (0-4). Data was analysed using SPSS for descriptive and inferential statistics at $p \leq 0.05$.

Results and Discussion: The mean age of the students was 22.53 ± 7.63 and majority were female (70%). The mean knowledge score was 4.39 ± 2.15 . The students had healthier OHP (45.5%) compared to their level of knowledge (18.5%). Dietary intake was characterized with daily intake of carbonated drinks (42.0%), biscuits (40.1%) and beverages (34.7%). Adequate nutrition knowledge is key in the prevention of risk factors associated with dental diseases. The students had poor knowledge of the role of nutrition in oral health care practices as evident in previous studies (2, 3) and inadequate oral health practice.

Table 1: Socio-demographic characteristics, knowledge score and oral health practice scores of students

Variable		Freq. (%)
Gender	Male	95 (30.0%)
	Female	219 (70.0%)
Age	<20	180 (57.3)
	21-25	82 (26.1%)
	26-30	19 (6.1%)
	>30	33 (10.5%)
	Mean \pm SD	22.53 \pm 7.63
Knowledge score	Good score	58 (18.5%)
	Fair score	99 (31.5%)
	Poor score	157 (50.0%)
	Mean \pm SD	4.39 \pm 2.15
Oral health score	Good score	143 (45.5%)
	Poor score	171 (55.5%)

Table 2: Nutritional knowledge, Oral health practices and dietary habits of the respondents

Variables	Male Freq. (%)	Female Freq. (%)	Total Freq. (%)	p-value
Nutritional Knowledge				
Sucrose is the Sugar that is Most caries prone	28(25.0)	84(75.0)	112(35.7)	0.209
Presence of calcium in food can stop dental caries	34(29.8)	80(70.2)	114(36.3)	0.033
Calcium and vitamin D are essential for tooth development	38(26.2)	107(73.8)	145(46.2)	0.290
Consumption of sugary foods can cause tooth decay	68(26.3)	191(73.7)	259(82.5)	0.002
Oral practices				
Brushed twice a day	61(31.0)	136(69.0)	197(62.7)	0.587
Rinsed mouth after meal	62(29.7)	147(70.3)	209(66.6)	0.748
Changed tooth brush every three months	43(26.1)	122(73.9)	165(52.5)	0.330
Did not brush teeth after consumption of sugary foods	53(31.2)	117(68.8)	170(54.1)	0.739
Dietary habits: Daily intake of				
Carbonated drinks			132(42.0)	
Juice			130(41.4)	
Beverages			109(34.7)	
Biscuits			126(40.1)	

Conclusion: The undergraduate students had inadequate nutritional knowledge of foods that could affect dental health which is reflected in their dietary habits and overall oral health practice.

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OE4

Effects of *Citrus aurantifolia* (lime) and *Cymbopogon citratus* (lemongrass) extracts on hyperlipidaemia induced male albino rats.

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KEYWORDS: Effects, Lime, Lemon grass, Hyperlipidaemia.

Background and objective of the study: *Citrus aurantifolia* (Lime) and *Cymbopogon citratus* (Lemon grass) are functional foods with distinct aromatic flavours, and rich in antioxidant properties. Hyperlipidaemia is implicated in some cardiovascular and cerebrovascular diseases. Globally, there is a high prevalence of morbidity and mortality associated with hyperlipidaemia and its associated complicating factors. It has been shown that plants' bioactivities have the potential roles in protecting people from numerous illnesses including hyperlipidaemia. However, there is paucity of studies on the effect of lime and lemon grass extract on hyperlipidaemic subjects in our locality. This study was designed to determine the effects of *Citrus aurantifolia* and *Cymbopogon citratus* extracts on hyperlipidaemia induced albino male rats.

Materials and method: An animal model of hyperlipidaemia was established in male albino rats. Forty male albino rats used for the study were divided into eight groups; the control group was fed a standard diet, while the other 7 groups were fed a high-fat diet for one month to induce hyperlipidemia. Lime and Lemon grass extracts of different milligrams respectively, were fed to the different groups (except the normal control and hyperlipidaemia control) of hyperlipidaemia rats for a period of fourteen days. Data obtained from biochemical analysis was expressed as mean and standard deviation, analysis of variance (ANOVA) was used to compare means and $P < 0.05$ was considered statistically significant.

Results and discussion: Total cholesterol level decreased with increased lime extract which is an indication that lime has a positive effect on total cholesterol levels of a hyperlipidaemic adult male rat. Reconstituted lemon grass extract had more positive effect on total cholesterol level of an induced hyperlipidaemia adult male rat compared to a diet which consist of hyperlipidaemic diet + 10% fortified biscuits with Baladi lemon peels powder which had a negative effect on total cholesterol level (1). The study equally revealed that reconstituted lemon grass extract diets had more effect in the reduction of LDL than reconstituted lime extract diets. Different test food samples have different effects on blood LDL levels because each sample having a unique component in a unique amount which creates a greater or lower effect to blood component levels.

Table 4.6: Effect of test diets on total cholesterol level of hyperlipidaemic adult male albino rats

Treatment Group	Baseline	After treatment	% Difference	p-value
Group 1	127.90±17.95	119.78±20.42	4.33↓ ^a	0.628
Group 2	219.55 ±30.77	231.10±70.46	3.85↑ ^a	0.646
Group 3	160.48± 15.44	153.85±21.68	3.73↓ ^a	0.585
Group 4	144.98±21.58	128.20±10.43	10.47↓ ^a	0.213
Group 5	129.75±11.90	112.50±20.11	13.22↓ ^a	0.152
Group 6	174.58±21.82	160.18±17.23	8.08↓ ^a	0.031*
Group 7	141.45±12.41	138.40±11.18	1.97↓ ^a	0.545
Group 8	190.38±92.81	136.88±2.58	17.95↓ ^a	0.341

n=4

Group 1 = Normal Control, Group 2 = Hyperlipidemia Control, Group 3 = 100 mg/kg *Citrus aurantifolia* (Reconstituted Lime extract), Group 4 = 300 mg/kg *Citrus aurantifolia* (Reconstituted Lime extract), Group 5 = 500 mg/kg *Citrus aurantifolia* (Reconstituted Lime extract), Group 6 = 100 mg/kg *Cymbopogon citratus* (Reconstituted Lemon grass Extract) Group 7 = 300 mg/kg *Cymbopogon citratus* (Reconstituted Lemon grass Extract), and Group 8 = 500 mg/kg *Cymbopogon citratus* (Reconstituted Lemon grass Extract)

Conclusion and Recommendation: This study revealed that high intakes of lemon grass had a positive effect in the reduction of total cholesterol levels while high intakes of lime had a positive effect in the reduction of Triacylglycerol (TAG). Since the test food samples have the potentials of bringing down lipid profile as seen in this study, its awareness on the health benefits and the need for its consumption could be seen as a preventive approach to addressing the high prevalence of hyperlipidemia in our society.

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Not as bad as portrayed! Scoping review of ultra processed foods and the application of Nova Classification System in Nigeria

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Background and objectives: Controversies, debates and propositions are building up across the globe on the correctness or deficiencies in the application of nova classification in non-communicable diseases risk reduction (1, 2). Therefore this study was designed to assess the utilization of the nova system in research and gaps in the nova classification of ultra-processed foods

Material and Methods: This study employed a mixed method study design to evaluate Nigerian evidence on ultra-processed foods. A systematic literature search for articles published from 2010 to 2021 was conducted using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocols. A narrative review was used to extract relevant content from previous articles and grey literature, data synthesized and deep analysis presented on the nova classification of processed foods.

Results: Results revealed a gap in the application of the nova system in data generation in Nigeria (3). Most studies considered processed foods in their entirety but did not acknowledge the highly/ultra-processed foods or nova categories. Classification based on nutrient content and functional ingredients rather than processing level/type will reposition ultra-processed food industries to ensure healthier products.

Conclusion: There is a dearth of nova application in Nigerian research. Product quality rather than processing method will positively influence healthy changes in the growing ultra-processed food market.

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