NUTRITION SOCIETY OF NIGERIA

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Theme:

Improving Nutrition Intervention Outcomes in Nigeria through Evidence-Based Nutrition, Data Generation and Dissemination

BOOK OF 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 includes, 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 purse 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:

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   - 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

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CONTENTS

UB-THEME E: NEW TECHNOLOGIES IN NUTRITION DATA GENERATION AND ANALYSIS		
ABSTRACTS ID	**ABSTRACTS TITLE**	**AUTHORS**
OE1	A Comparison Of Response Rate In Web-Based And Paper-Based Method Of Data Collection In Nutritional Survey	Adepoju, A. B. and *Gabriel, E
OE2	Effect of Processing on the Proximate Composition and Antioxidant Components of Tomato (Lycopersicon esculentum).	*Nwajagu .I.U[a], Chukwuekezie .N.E[b], Umar .A.T[a,c], Abah .C.R[d], Kahu .J.C[c] and Olagunju .A[a].

SUB-THEME F: STRENGTHENING MDAS-ACADEMIA-INDUSTRY LINKAGES FOR DEMAND-DRIVEN NUTRITION DATA GENERATION AND PRIORITIZATION		
ABSTRACTS ID	**ABSTRACTS TITLE**	**AUTHORS**
OF2	Programmes and Academia Partnership Increased Faculty and Student Capacity while Reducing Research Costs	Adeyemi, O.A., Samuel, F.
PE3	Drone Technology In Data Collection For Nutrition Survey	Duru C.O and Dr Nweze C.C

SUB-THEME H: RECENT DEVELOPMENTS IN MATERNAL, CHILD AND ADOLESCENT NUTRITION		
ABSTRACTS ID	**ABSTRACTS TITLE**	**AUTHORS**
OH2	Anthropometric, Serum Zinc And Vitamin A Status Of Secondary School Adolescents In Udenu Local Government Area, Enugu State, Nigeria.	Afiaenyi, I. C[1]., Aleke M. C[2]. and Okafor A. M[3].
OH3	Functional Properties Of Germinated Brown Finger Millet Complemented With Bambara-Nut Protein Concentrate And Carrot Flour	*[1]Maxwell Y. M. O., [1]Achugwoh S. C., [1]Jiya M. J. and [2]Maude M. M
OH4	Anthropometric Indices Of Infants And Mother's Knowledge And Practice Of Exclusive Breastfeeding In Abuja Municipal Area Council, Abuja, Nigeria	Okafor Adaobi Mary-Ann; Ikwumere Chinaza Mary and Idahosa Sandra Osemekhia
OH5	Breastfeeding Knowledge, Attitude And Barriers Among Nursing Mothers In Ado-Odo/Ota Local Government Area Of Ogun State.	*Adebayo, Y. O[1]., Akinsanya, O. B[2] and Joseph P. C[2]
OH6	Prevalence Of Malnutrition Among Mothers And Children 0-6 Months In Jos And Jigawa State Nigeria, A Comparative Analysis.	Raphael, C. O., [1*] Adah, R.,[2] Ibrahim, H. U.,[3] John, C.[4]

OH6	Prevalence Of Malnutrition Among Mothers And Children 0-6 Months In Jos And Jigawa State Nigeria, A Comparative Analysis.	Raphael, C. O., [1*] Adah, R.,[2] Ibrahim, H. U., [3] John, C.[4]
OH7	Chemical Composition and Sensory Evaluation of White Maize-based Complementary Food Fortified with African Palm Weevil Larvae and Beetroot	[1]Chukwu, C. G., [2]Uzokwe, C. A and [3]Owolabi, A
OH8	Assessment Of Micronutrient Status Pregnant Women Attending Antenatal Care At Barau Dikko Teaching Hospital, Kaduna	Okoye GodsGift Ngozi [1], James Dorcas Bolanle [1], Anjuwon Tayo Micheal [1] Umar Abubakar_Tanimu [1, 2]
OH9	Analyzing Food Consumption Pattern, Dietary Diversity and Coping Strategy of Farm Families in Kogi State, Nigeria	[1]Ibrahim M.K, [2]Opega L.J and [3]David I.T
OH10	Metabolic Screening For Phenylketouria In Newborn Babies And Provision Of Subsidized Phe- Free Formular In Nigerian Hospital.	Onyedum E. D-F.
OH11	Amino Acid Profile And Microbiological Quality Of Complementary Diets From Blends Of Fermented Millet (*Pennisetum glaucum L)*,With Groundnut (*Arachis hypogeae D*) And *Moringa oleifera* Flours	* Awogbenja, M.D
OH12	Prevalence of Malnutrition Among Children Aged 6-59 Months in Kaduna State, Nigeria	[1]Okwori, E and [2]Nnam, N. M
OH13	Food Consumption Patterns of Secondary School Adolescents aged 10-18years in Enugu Urban Area of Enugu State, Nigeria	Eze S.N., Atadu C.U., Ani P.N. and Ngwu E.K.
OH15 .	The Evaluation Of The Protein Quality Of A Composite Meal From Rice, Cowpea And Sunflower	Laminu,HH[1] and Salihu,MA[1]
PH16	Food Consumption Pattern And Anthropometric Measure Of Orphanage Children In Eastern And Western District Of Kogi State.	[1]Nweze E ,[2]Ibeanu V.N, [3]Egumgbe, U.D.
PH17	Amino Acids Profile Of Germinated Brown Finger Millet Complemented With Bambara Nut Protein Concentrate And Carrot Flour	*[1]Maxwell Y. M. O., [1]Zubair A. B., [1]Jimoh T. A. and [2]Maude M. M

Ph18	Assessment of Infant and Young Child Feeding (IYCF) Practices among 6-23 months Old Children in Gombe state, Nigeria based on some WHO Core Indicators.	Kelechi-Ebisike, V. O[1], Solomon, M. D[1], Jaryum, K.H[1], Ebisike, K. J[2], Danjin.M[3], Mshelia, P[1]
Ph19	Assessment of Nutritional Knowledge and Feeding Behaviour of Children in Some Selected Day Care Centres in Sabon-Gari L.G.A Kaduna, Nigeria	*Onu, R.O., *Okwori, E and** Natala. C
Oh20	Assessment of Dietary Pattern and Nutritional Status of Women of Childbearing Age in Kano Municipal Local Government Area, Kano State, Nigeria	Sa'id A.M*, Aliyu, U. A, Abubakar, S.M. and Gadanya, A.M.
Oh21	Iron Deficiency Anaemia among Pregnant Women Attending Antenatal Care Unit, Aminu Kano Teaching Hospital, Kano	[1]*Saliu, M.A., [1]Aminu, S., [2]Ibn-Shuaib, M.M., [1]Mada, S.B. and [1]Salihu, A.
Oh22	Formulation and Quality Evaluation of a Complementary Food Blend from Fermented Yellow Maize, Soybean and Fishmeal	Mohammed Z.K[1], Petrol B.B[2] and Ahmad U[2]
Oh23	The Relationship Between Dietary Pattern and Severity of Pain Crisis In Adolescents With Sickle Cell Anaemia Attending Barrau Dikko Teaching Hospital (BDTH), Kaduna.	Olorunfemi-Kayode A. M[1], Aimola I. A[1], Nzelibe H. C [1], Ndidi U. S[1], Bello-Manga H,[2] Mamman A. I.[3]
Oh24	Prevalence of the Double Burden of Malnutrition among Undergraduates in Selected Tertiary Institution in Ibadan, Oyo State	Oketunde F.B.
Oh25	Prevalence and Severity of Anaemia among Pregnant Women at First Antenatal Care Visit, Aminu Kano Teaching Hospital, Kano	[1]Saliu, M.A., [1]Zailani, H., [1]Bello, Z.K., [2]Mohammed, R.A. and [3]Hamza, K.L.
Oh26	Food Consumption Patterns of Secondary School Adolescents aged 10 - 18years in Enugu Urban Area of Enugu State, Nigeria	Eze S.N., Atadu C.U., Ani P.N. and Ngwu E.K

SUB-THEME I: NUTRITION INTERVENTIONS THROUGH THE USE OF NUTRITION-INTEGRATED AGRICULTURE, FUNCTIONAL FOODS AND NUTRACEUTICALS

ABSTRACTS ID	ABSTRACTS TITLE	AUTHORS
Oi1	Enhancing The Proximate Composition And Beta-Carotene Contents Of Snacks (Chin–Chin And Doughnut) Through Incorporation Of Orange-Fleshed Sweet	Ukozor, A.U.C and Osuji C.P.

Oi2	Potato Antioxidant Effect Of Aqueous Extract Of Watermelon (*Citrullus lanatus*) Seeds In Paracetamol Induced Rats	Muhammad A[1*], Ameh D.A[1], Hassan S.M[1], Ibrahim F[1]
Oi3	Evaluation Of The Biochemical Impact Of Varied Mixtures Of Extracts Of *Vernomia amygdalina* (Bitter leaf) and *Gnetum Africanum* (Okazi leaf) On Alloxan Induced Diabetic Wistar Rats	Ifeanacho,M.O[1*] and Oshotse,R.B[2]
Oi4	Nutrients and Phytochemicals Composition of Methanolic Extract of Four Edible Spices Commonly use in the Preparation of Soups in South-West Nigeria	[1]Olanrewaju, O.O, [2]Ifebajo, Abiodun Y, and [3]Folahan, Olaide.O

SUB-THEME I: NUTRITION INTERVENTIONS THROUGH THE USE OF NUTRITION-INTEGRATED AGRICULTURE, FUNCTIONAL FOODS AND NUTRACEUTICALS

ABSTRACTS ID	ABSTRACTS TITLE	AUTHORS
Pi6	Comparative Study on the Proximate Composition of Indigenous Sweet Potato and Orange Fleshed Sweet Potato *(IpomoeaBatatas*) in Abeokuta Metropolis	Olayiwola I. O[1], Agoro A.A[1] and John E. P[1]
Pi7	Evaluation Of The Sensory Qualities Of Two Enriched Cereal Base Foods (Tuwo Masara and Tuwo Shinkafa) with Bambara nut (*Vigna subterranean*) flour	Adesanya O.D[1], Eduzor[2] E., Agu H.O[3], Musa M[1] and Akinsanya O.B[4]
Oi8	Proximate Composition And Sensory Evaluation Of Snacks (Chinchin And Buns) Enriched With Tigernut (Cyperus esculentus) and Coconut (Cocos nucifera) milk.	Mbah, C.A., Ukozor, A.U.C. And Maduabuchi, Q.A.
Pi10	Mineral Content And Health Risk Assessment Of Date Fruit (*Phoenix dactylifera*) Sold In Dutse, Jigawa-Nigeria.	[1]*Abubakar, N., Yakasai, M.H., [1]Abdulbaki, I., [2]Shehu, D., [2]Murtala, Y. and [2]Babandi, A.
Pi11	Assessment Of Nutrient Composition And Acceptability Of Cookies From Plantain, Cocoyam And Soya Beans Flour	Adepoju[1]*, Oladejo Thomas; Owanikin[1], Tomilola 'Seun And Adeniji[2] Paulina Funke
Pi12	Natural Remedy For Malaria Illness Using Functional Food	ESTHER IFEOMA MMENI
PI13	Nutrition Intervention And New Food Product Development In Tackling Hidden Hunger, Obesity, Non-Communicable Diseases Through The Use Of Locally Formulated, Produced And Registered Functional Foods And	ESTHER IFEOMA MMENI

PI14	Ready To Use Nutritional Food (Runf) For Maternal, Infant Child, Adolescent And The Aged Health Care Comparative Determination of Phytochemical and antioxidant properties of Three different species of Onion (Allium cepa)	Bamigboye, A. Y.[1]*, Adepoju, O. T[2] and Akinyemi, O. J.[3]
Oi15	Evaluation of the Chemical Composition and Anti Nutritional Factors (ANFs) in Different Thermally Processed *Detarium senegalense* (Tallow) Seed Flour	[1] Adamu, H., [2] Nzelibe, H.C., [2] Shuibu, M.N., [3]Adamu, Z., [1]Onu, R.O., [1]Muhammad, A.A., [1]Bayero, k.
OI16	Effect of telfaira occidentalis (Ugu) dietary supplemention on some haematological parameters and tissue iron stores of female mice before and after gestation	* Aminu, Z., Opii, P., Okolo, I., and Owolabi, O.A
OI17	The effect of methanolic leave extract of Ocimum gratisimum on insulin resistance and GLUT-4 gene expression in Monosodium glutamate induced obese Rats	Hauwa'uYakubu Bako*, Halliru Umar Farouk, Hafsat Rufa'i, Sumaiyah Shehu, Amina Husnah Balarabe, Jaafaru Sani Mohammed
OI18	Anthropometric and Biochemical Profile of Renal Patients attending Nephrology Clinic at Federal Medical Centre, Idi-Aba, Abeokuta, Ogun State.	Kupoluyi, O.E,[1] Otunla, A.T[2] and Iheme G.O[3]

SUB-THEME J: CURRENT TRENDS IN TACKLING HIDDEN HUNGER, OBESITY AND NON-COMMUNICABLE DISEASES IN NIGERIA

ABSTRACTS ID	ABSTRACTS TITLE	AUTHORS
OJ1	Knowledge of Obesity on Reproductive Health Outcomes of young Female Adults (19-35years) in Owo Local Government Area of Ondo State, Nigeria	*Olanrewaju O.I**Dele-Olawumi Bukola, *Edun, B.T
PJ2	Prevalence Of Obesity Among Adult Resident In Bida, Niger State	*Maude M.M. and Abdulkadir F.
OJ3	Development And Evaluation Of Diet And Fitness Application For Nigerian Individuals	Akinloye O.V, Olawuyi Y.O, Oyebamiji E.A (RD), Akinjide M.O
OJ6	Assessment of Some Micronutrients in Commonly Consumed Native Soups among Nupe People of Niger State, Nigeria	Uthman, A[1]*., Anigo, K.M.[1]., Atawodi, S.E. [1]., Musa, A[2]., and Abdulazeez, A[3].
OJ7	Proximate Composition and Acceptability of Cookies made from Tiger Nut Flour (cyperus esculentus).	Olayiwola I. O, Adedokun V. M and John E. P
OJ8	Effects of Socio-demographic Characteristics on the Consumption Pattern of Snacks among Young Adults in Bauchi State.	Adebusoye M. S[1] and John E. P [2]

OJ9	A Community-Based Survey Of Hypertension And Associated Risk Factors Among Rural Adults In Abia State, Nigeria	Ortutu, B., Diara, S.C., Ukegbu, P. O. and Nwamadi C. P.
OJ10	Prevalence Of Cardiovascular Risk Factors Among Adults In a Rural Nigerian Community	Okafor, Adaobi Mary-Ann and Eze, Euphemia Onyebuchi
OJ11	Prevalence Of Cardiovascular Disease Risk Factors Among Adults In Rural Southeast Nigeria	Ayogu RNB, Eze MG, Okafor AM, Udenta EA
PJ12	Food Consumption score, Dietary habits and Anthropometric Indices of Market Traders in Owo Township, Ondo State, Nigeria	Folahan, O.O, Odunuga, B.A Ifebajo A.Y,
PJ13	The Acceptability of Lesser-known indigenous leafy Vegetables (Cocoyam and Sweet potato leaves) in soups of households in South-East, Nigeria	Mberekpe, P. B
PJ14	Beverage Consumption, Risk Of Dental Caries And Nutritional Status Among Adolescents In Ido Local Government, Ibadan, Nigeria	Bolajoko O.O[1], Adeola A.A[1], and Onafowokan M.A[2].
PJ15	Comparative Study on the Anthropometric Measurements, Physical Activity Level, and Prevalence of Non-Communicable Diseases among Bauchi and Gombe State University Staff, In North East.	Umar M. M, Abdullateef O. J, Adeosun F. F, Gidado. H. J.
PJ16	Chemical composition of Hibiscus sabdariffa .L. calyx powder	Ayogu RNB, Akunyili JC, Afiaenyi IC
PJ17	Prevalence of Micronutrients Deficiency Among the Under-five And Women of Child Bearing Age in Northern Nigeria: Current Strategies put in Place to curb them.	Magaji SA.[1,] Mbochi ALC[2], Shanu AM[2] , Agboola FO [2], Tokode EA[3] , Misbahu BI [1] and Sabo S [1] .

SUB-THEME K: NUTRITION, IMMUNITY AND EMERGING PANDEMIC INFECTIONS

ABSTRACTS ID	ABSTRACTS TITLE	AUTHORS
OK1	COVID-19 Knowledge, Perception and Food Consumption Pattern of Adult Nigerians	Iheme G.O[1], Jagun A.O[2], Egechizuorom I.M[3], Edafioghor L.O[4], Adeleke F.A[5], Mebude A.S[6], Enuka H.C[7], Asouzu N.C[8], Kupoluyi O.E[9], Onyekwere C.C[10], Ogbonna O.C[11], Adile A.D[12], Idris H[13] and Oyebamiji E.A[14]
OK2	COVID - 19 and Immunity- Can Consumer Knowledge and Perception about Herbs and Spices Play a Role?	Adebusoye M. S[1] and John E. P [2]

OA1

Application of the Revised 2008 WHO-IYCF Indicators in Nigeria; A Meta-Analysis of the Core Complementary Feeding Indicators

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KEYWORDS: Complementary feeding, Indicators, Application, Nigeria

BACKGROUND AND OBJECTIVE:
The lack of clear international recommendations for some aspects of Infant and Young Child Feeding (IYCF) has halted the development of universal indicators to define optimal feeding. A comprehensive set of validated core IYCF indicators replaced the previous guideline and created a consensus on breastfeeding and complementary feeding (CF) indicators (1). These revised indicators have been widely generated in national studies, as evidence have shown that the Demographic and Health Surveys of countries have totally adopted these core IYCF indicators. It remains unknown how local studies have applied these core CF indicators in their data generation. This study aimed to evaluate the rate of adoption of core CF indicators in Nigeria.

MATERIALS AND METHODS:
Meta-analysis of literatures on complementary feeding indicators utilized in Nigeria by articles published from 2009-2019 was reviewed. Review of abstracts and full texts followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A bibliographic survey was carried out in these databases; Google scholar, PubMed, and African Journal Online (AJOL). The descriptors used were; Infant and young child feeding practices, Complementary feeding practices, 6-23 months, Nigeria, combined with boolean "OR" and "AND" operators. Studies on special needs or HIV/AIDS children were excluded. A total of thirty-three (33) articles met the inclusion criteria. Eligible studies were compared to the revised core complementary frequency indicators. Data was analyzed using SPSS version 22.

RESULTS AND DISCUSSION:
Results on trends in the mean utilization of CF indicators by reviewed articles showed that none of the core CF indicators were utilized in articles published from 2009 to 2015. Recent studies on IYCF published in 2015, 2016, 2017 and 2019 reported a mean utilization score of 0.4, 0.75, 1.33 and 1.50 respectively out of an available five (5) indicators. Results on the application of individual core CF indicators in data

generation showed that; introduction of semi-solid foods (75.8%) and minimum meal frequency (36.4%) indicators were inappropriately utilized. Consumption of iron rich foods/supplements indicator was unavailable in all (100%) the reviewed studies. The observed abysmal/slow adoption of these indicators agrees with assertions by Hajeebhoy *et al*., (2) that complementary feeding indicators do not enjoy the same degree of understanding and visibility of breastfeeding indicators which are well understood and effectively utilized/applied.

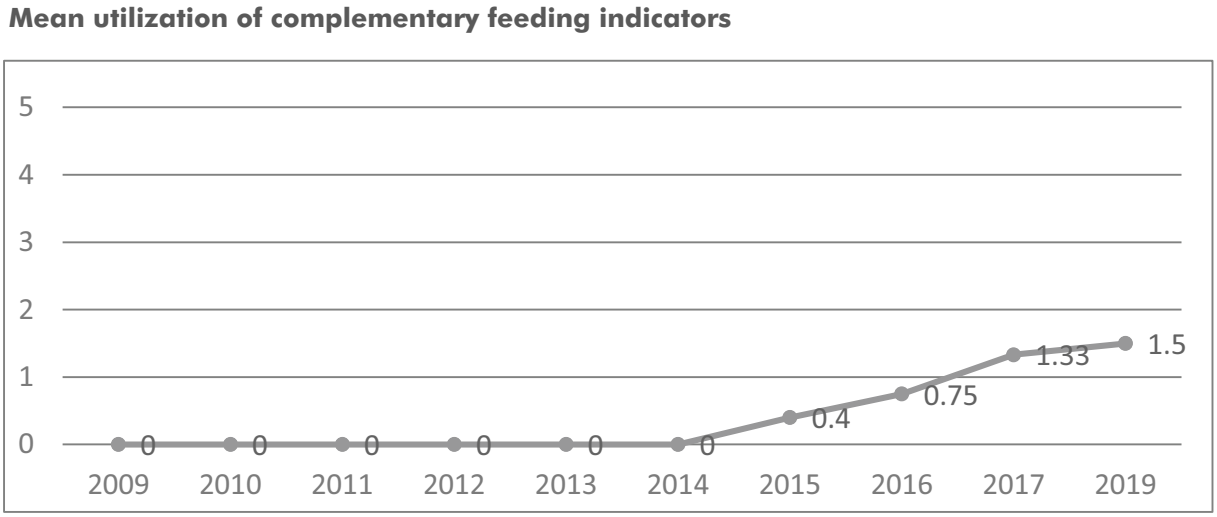

Fig 1. Trends in the mean utilization of complementary feeding indicators (2009-2019).

Table 1. Adoption of individual core IYCF indicators

	Appropriate		Inappropriate		Unavailable	
	F	%	F	%	F	%
Introduction of semi-solid foods	3	9.1	27	81.8	3	9.1
Minimum Dietary Diversity	5	15.2	1	3.0	27	81.8
Minimum Meal Frequency	5	15.2	12	36.4	16	48.5
Minimum Adequate Diet	5	15.2	0	0.0	28	84.8
Consumption of Iron rich foods or iron fortified foods/supplements	0	0.0	0	0.0	33	100.0

Appropriate =Indicators generated in accordance to specified guidelines/recommendation
Inappropriate=Similar to core IYCF indicators but recommended age/categories not considered
Unavailable = IYCF core indicators not generated at all

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OC1

Assessment of Knowledge of Nutrition Among Caregivers & Feeding Practices of Children Under 5 in Orphanages of Kaduna Metropolis.

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KEYWORDS: Orphans, Caregivers, Nutrition, Non-probability sampling

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BACKGROUND AND OBJECTIVES:

Children who are orphaned are faced with an increasing risk of becoming malnourished. Knowledge of nutrition among caregivers is critical in determining diet quality and overall improvement of the quality of life of orphans. This study seeks to evaluate the knowledge of nutrition of caregivers in orphanages and its relationship with infant and young child feeding (IYCF) practices in the metropolis of Kaduna state, Nigeria.

MATERIALS AND METHODS:

27 caregivers and 87 orphans aged under 5 years were drawn from the 12 orphanages within Kaduna metropolis by Convenience Non-probability sampling technique and surveyed with the aid of Knowledge Attitudes and Practice questionnaires developed by the Food and Agriculture Organization (FAO). Feeding practice was assessed with the aid of an IYCF questionnaire in addition to a Food Frequency Questionnaire developed by (WHO, 2008). Pearson's correlation was used to establish relationships between caregivers' nutrition knowledge & children's feeding practices.

RESULTS:

Demographic characteristics of the caregivers revealed an 82% women to 18% men population. The children under 5 were mostly aged between 13 to 24 months (38%) with the Female 53% while the male orphan population was 47%. Nutrition knowledge scores developed using the FAO Knowledge, Attitudes and Practice (KAP) manual revealed about 63% of the caregivers had generally low (less than 50%) knowledge of nutrition. IYCF indicators showed a Minimum Meal Frequency (Proportion of non-breastfed children 6-23 months of age who receive solid, semi-solid, or soft foods or milk feeds at least 4 times or more) of 44%. Minimum Acceptable Diet (MAD) (Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk). of 17% while Minimum Dietary Diversity (MDD) (Proportion of children 6-23 months of age who receive foods from 4 or more food groups) was 27%. Pearson's correlation showed significant association at ($P = 0.01$) between Level of Caregivers education

and their nutrition knowledge scores. A strong association between caregiver nutrition knowledge score and IYCF practice indicated a positive association with MDD (r = 0.470), MAD (r = 0.423) and Children Ever Breastfed (r = 0.427).

CONCLUSIONS:
This study shows the need for nutrition intervention programs targeting caregivers, such as providing basic nutrition education on selected days in orphanages by Community Health Extension Workers (CHEWs) as a viable strategy for improving the IYCF practice in orphanages of Kaduna Metropolis, Kaduna state, Nigeria.

LIMITATIONS:
The authors recognize that the sampling methodology used in this study could introduce basis for bias in the results obtained. However, sampling was generally representative of the population of interest and inferences made are intended only for children under 5 and their caregivers in orphanages of Kaduna Metropolis.

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OC2

Dietary Diversity Scores Among Hypertensive Patients Attending Murtala Muhammad Specialist Hospital In Kano Metropolis

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KEYWORDS: dietary diversity, food quality, Hypertension, non-communicable
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BACKGROUND AND OBJECTIVES:
Monitoring of the food quality is highly important in the developing countries like Nigeria due to the increased in the burden of non-communicable diseases such as hypertension, unlike developed countries that has been already in the process of the monitoring of the quality of food (1). The rapid coexistence of nutritional deficiencies and the emergence of chronic disease along with the poor management in developing countries is highly alarming, which is associated with the low level of economic development, urbanization, poor quality of food and poor living condition (2). Dietary diversity scores can be defined as the number of food groups represented in the diet over period of time. (3). Diversification in the Nigerian diet is not known, hence, these necessitate the need of this study as an approach to help in the management of the

non-communicable disease such as hypertension.

MATERIALS AND METHODS:

The study was cross-sectional study, which involves 200 participants (140 were hypertensive and 60 non-hypertensive). , Information on the individual respondent qualitative food consumption pattern was collected using in-built structured 24-hours dietary recall questionnaire. A 14 food group model was used to evaluate Dietary diversity score recommended by FAO (4). A DDS terciles for low (1-4), medium (5-9) and high (10-15), was also constructed. Data was analyzed using SPSS version 20.0. DDS were compared using one way ANOVA. The independent-sample t-test was used to compare the mean.

RESULT AND DISCUSSION:

Table 1 shows the dietary diversity score of the hypertensive and normotensive individuals, the average of individual dietary diversity score for the food groups consumed in the day before the study was 5.5±0.25 for normotensive, while that of hypertensive was against 6.8±0.31. Hypertensive patients in the study seemed to have a better diversity in their diet with 9% of them had high score against normotensive. For the groups, 23% of the respondents had low DDS and in general both the hypertensive and normotensive respondents had average DDS.

Table 1 Summary table of dietary diversity score of the two studies populations

Dietary Diversity Score	Non-hypertensive patients (%) Medium ± SD = 5.5±1.25	Hypertensive patients (%) Medium ± SD = 6.8±1.94
1	0.6	0.8
2	0.6	0.8
3	4	7
4	12	16
5	21	28
6	27	29
7	17	16
8	10	12
9	5	4
10	1	3
11	2	4
12	1	2
13	3	1
Dietary Diversity Terciles		
Low (1-4)	22.5	24.5
Medium (5-9)	81	70
High (10-14)	1.5	9

CONCLUSION ANND RECOOMENDATION:

Dietary diversity is very important in the management of several diseases such as hypertension and obesity because each plant family has a unique combination of phyto-nutrients that may bind to specific proteins in

the body. Feeding behavior of the respondents was found to be related to the financial status, therefore. it is important to educate the patients on the healing properties of good alimentation particularly fruits and vegetables consumption. Hence, it will therefore be appropriate to prescribe a healthy diet for our patients after each consultation.

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OC3

Assessment Of Nutritional Knowledge, Atttitude And Practices Among Hypertensive Patients Attendding Murtala Muhammed Specialist Hospital Kano

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KEYWORDS: knowledge, nutritional, Hypertension, non-communicable

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BACKGROUND AND OBJECTIVES

The high prevalence of non-communicable diseases such as hypertension and their risk factors among the general urban population of Kano state necessitates an urgent implementation of nutritional intervention programs to curtail these risk factors (1). The roles of dietary approaches in the treatment of hypertension have been well documented. Poor attitude of healthy eating habits appears to be partly due to inadequate knowledge and/or practices of good nutrition (2). However, there is limited information on the nutrition Knowledge, attitude and practice among hypertensive patients in Kano. The objective of this study was to assess the nutritional knowledge, attitude and practices among hypertensive out-patients attending Murtala Muhammad Specialist Hospitals, Kano.

MATERIALS AND METHODS

The study was cross-sectional study, which involved 200 participants (140 were hypertensive and 60 were non-hypertensive),Data on KAP of nutrition were collected using a modified questionnaire designed by FAO-UN(3).Data were analyzed using Statistical Package for Social Sciences (SPSS) version 20.0, and data

were presented as %. To determine the association between nutritional knowledge, attitude and practice X^2 test was performed.

RESULT AND DISCUSSION

Nutritional attitude of hypertensive and non-hypertensive respondent attending Murtala Muhammad specialist hospitals in Kano metropolis is presented in Table 1. Over 80% of the subjects lack nutrition knowledge. Table 2 shows nutritional attitude and practice of the respondents. The finding showed that there was poor attitude to healthy eating habits among the hypertensive patient respondents.

Table 1: Nutritional Knowledge

S/N	QUESTIONS	CHOICE	HYP(%)	CONT(%)	X^2
1	Awareness on significance of Nutrition	YES	77.8	22.2	0.713
		NO	80.5	19.5	
2	Awareness on balance diet	YES	75.0	25.0	0.440
		NO	81.0	19.0	
3	Awereness on the main food nutrient	YES	71.4	28.6	0.059
		NO	83.3	16.7	
4	Awareness on the risk of overweight	YES	66.7	33.3	0.002
		NO	85.7	14.3	
5	Awareness on the knowledge of food for growth and development	YES	69.2	30.8	0.024
		NO	83.8	16.2	
6	Awereness on the risk of overfeeding	YES	66.7	33.3	0.002
		NO	85.7	14.3	
7	Awareness of the harmful foods	YES	73.3	26.7	0.123
		NO	82.9	17.1	
8	Awareness on the best source of nutrition information is hospitals	YES	76.2	23.8	0.252
		NO	82.8	17.2	
9	Having problems with appetite	YES	78.6	21.4	0.247
		NO	87.5	12.5	
10	Loosing weight using pills, laxatives, not eating	YES	82.9	17.1	0.123
		NO	73.3	26.7	

HYP (Hypertensive), CONT (non -hypertensive)

S/N	QUESTIONS	CHOICE	HYP (%)	CONT (%)	X^2
1	How often do you eat food substance rich in carbohydrate	PA	76.9	23.1	0.041
		DP	0.0	0.0	
		PR	90.9	9.1	
2	How often do you eat body building foods like egg, beans and milk	PA	77.8	22.2	0.556
		DP	0.0	0.0	
		PR	81.2	18.8	
3	How often do you eat fats and oils food substances	PA	50.0	50.0	0.030
		DP	0.0	0.0	
		PR	81.2	18.8	
4	How often do you eat food that are rich in vitamins like fruits,vegetable etc.	PA	80.0	20.0	0.039
		DP	88.9	11.1	
		PR	72.7	27.3	
5	How often do you drink eight and more glasses of water daily	PA	87.0	13.0	0.023
		DP	0.0	0.0	
		PR	74.1	25.9	
6	How often do you plan and keep to a balance food menu	PA	66.7	33.3	0.000
		DP	75.0	25.0	
		PR	100	0.0	
7	How often do you eat foods rich in fibre/roughages like skin of fruits, wheat and grains	PA	86.7	13.3	0.264
		DP	80.0	20.0	
		PR	76.0	15.4	
8	How often do you eat fried foods and other fattening foods	PA	50.0	50.0	0.006
		DP	80.0	20.0	
		PR	84.6	15.4	
9	How often did you exercise	PA	83.3	16.7	0.353
		DP	75.0	25.0	
		PR	83.3	16.7	
10	How often do you take vitamins and minerals supplements	PA	50.0	50.0	0.000
		DP	70.4	29.6	
		PR	95.2	4.8	

PA= practice Always DP= Do not practice PR= Practice rarely, HYP (Hypertensive), CONT (non-hypertensive)

CONCLUSION ANND RECOOMENDATION

Poor nutrition KAP was observed among the study participants, hence, there is a need to integrate nutrition education in the management of hypertension.

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OD1

Nutritional Status and Composite Index of Anthropometric Failure among School-Age Children Enrolled in School Feeding Programme in Zaria.

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KEYWORDS: Malnutrition, School Feeding Programme, nutritional status, School-Age Children.

BACKGROUND AND OBJECTIVES

Nutritional status correlates with health, cognition, psychomotor, and school performance of School-Aged Children (SAC) [1]. Composite Index of Anthropometric Failure (CIAF) measures the magnitude and severity of malnutrition in a population. Most of the published studies on the prevalence of undernutrition focused on under-five children using the three conventional indices (Stunting, wasting, and underweight) - while neglecting School-Aged Children. Thus, this study reports the prevalence of malnutrition and its magnitude using the Composite Index of Anthropometric Failure (CIAF) among the School-Aged Children enrolled in the National Homegrown School Feeding Programme in Zaria LGA.

MATERIALS AND METHODS

Three hundred and fifteen (315) healthy, consented School-Age Children enrolled in the School Feeding Programme in the four sampled schools from four randomly selected wards at the time of the study were recruited. Anthropometric data were collected using the methods described in FANTA guidelines [2] and the CIAF was calculated using seven categories [3]. The anthropometric data were converted into Z-scores using WHO Anthroplus 2007.

RESULTS AND DISCUSSION

The overall prevalence of malnutrition among the study subjects is shown in Figure 1. The prevalence of the 3 conventional indices of malnutrition viz; stunting, wasting, and underweight were 22.1%, 9.1%, and 18.5% respectively.

With regard to the severity of the malnutrition, Table 1 revealed that 29.4% of the participants had at least a nutritional deficit. The proportion of the boys with at least a nutritional deficit (32.9%) is significantly higher ($p<0.05$) than that of the girls (25.8%).

Malnutrition is considered to be of public health concern in developing countries and countries in transition, Nigeria included. From this study, a slight decrease in the prevalence of malnutrition using the 3 conventional indices among SAC in the LGA was seen from the prevalence rates earlier reported [4]. This can be attributed to the implementation of the School Feeding Program that is aimed at reducing hunger and improving the nutritional status of pupils. Also, the prevalence from the 3 conventional indices is less than CIAF (29.4%). Thus CIAF gives the total burden or severity more than the three conventional indices.

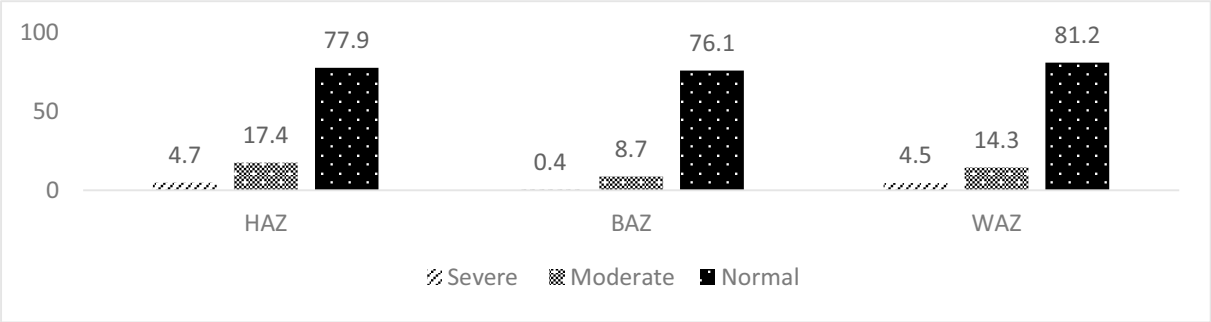

Figure 1: Prevalence of Malnutrition among School-Aged Children enrolled in School Feeding Programme in Zaria LGA, Kaduna State.

Table 1: Composite Index of Anthropometric Failure (CIAF) among School-Aged Children enrolled in School Feeding Programme in Zaria LGA, Kaduna State

Groups	Boys (n=127)	Percentage	Girls (n=139)	Percentage	Total (n=266)	Percentage
A	85	66.9	103	74.1	188	70.7
B	6	4.7	2	1.4	8	3.0
C	4	3.1	2	1.4	6	2.3
D	5	3.9	5	3.6	10	3.8
E	14	11.0	12	8.6	26	9.8
F	9	7.1	11	7.9	20	7.5
Y	4	3.1	4	2.9	8	3.0
CIAF	42	32.9	36	25.8	78	29.4

Group A (No failure), B (wasting only) C (wasting and underweight only), D (Wasting, stunting and underweight), E (stunting and underweight), F (Stunting only), and Y= (Underweight only).

CONCLUSION AND RECOMMENDATION

Undernutrition still exists among the School-Age Children in Zaria LGA despite the introduction of the School Feeding Programme. Hence, there is a need to introduce other sustainable modalities of the implementation of the programme and other public health strategies.

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OD2

Re-Engaging the Policy and Programme Contexts for Advancing the Nutrition Data Value Chain Approach in Nigeria?

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KEYWORDS: Data value chain, M&E framework, data prioritisation, data curation, data visualisation

ABSTRACT

Recently, the attention of the nutrition community has sought to inspire data value chain development and utilisation in the World by creating awareness on the crucial importance of reliable data in the fight against malnutrition. The impact and importance of good data value chain to nutrition policy and program design have been established. Nigeria has robust policies, strategies and large-scale programs for tackling malnutrition. For instance, the National Food and Nutrition Policy provides the framework for addressing the problems of food and nutrition insecurity in Nigeria; the Primary Health Care system is one of the most widespread entry points for nutrition interventions and the Maternal, Newborn and Child Health Week provides a biannual avenue for delivering a pack of health interventions, nutrition inclusive to mothers, infants and children.

Using a realist approach, this presentation highlights nutrition data value chain challenges Nigeria. We layout issues to be considered in improving the use of data and make recommendations on improving nutrition data value chain in Nigeria. We analysed sectoral policy documents for each data value chain component in Nigeria. Using breastfeeding, as an illustration, we examined the availability of data across multiple sources population-based household surveys (e.g. NDHS) and administrative data (such as DHIS).
Data systems currently existing in Nigeria can be hinged for evidence-based decisions, action and policymaking. Data on intervention coverage, determinants of malnutrition and outcomes are available from population surveys and various administrative data systems. Population-based surveys such as MICS and NDHS provides comprehensive data mostly at the state, regional and national level on crucial nutrition determinants and outcomes. The administrative data are mostly sectorally collected by the core ministries and departments delivering the interventions. They include the DHIS for health indicators and WASH Norms for Water quality. These administrative data provide the best data source for LGA and Wards in Nigeria and is vital for targeting of interventions. Critical issues for administrative data include (a) missing operational data that might enable attribution to impact (b) difficulty of merging datasets given differences in the data collection, sampling, sample population, among others.

Nigeria is yet to fully maximise the data collected till date for goal tracking, program/strategy refinement and impact evaluation. National, state and LGA targets can be tracked annually using data. Currently, the states' scorecard on nutrition by the Nigerian Governors Forum is an example of using data visualisation for tracking progress. When executed annually, it will provide year-to-year state performance on selected indicators. Another use of data is for program, strategy and policy tracking and review. The national policies and plans of actions implicitly use data for planning, but midline and endline strategy reviews must be conducted at both the national and state level to aid program and plan refinement. Medium- and long-term data review can help determine the cost-benefit ratio and impact of the program. It provides an avenue for

coverage correction, demand and supply issues and inputs. This process of data-backed refinement is currently missing in large national programs such as MNCHW. Administrative data are essential for assessing the impact of various components of the intervention, e.g. the delivery of essential nutrition actions at the primary health care or impact of specific nutrition-sensitive interventions on nutrition outcomes.

Critical recommendations for the data value chain begin with the promotion of data use. Seeing as data is an integral part of program/strategy refinement and progress tracking, the capacity of nutrition officers, planning officers needs to be developed. Knowledge of sources of data, confounders and translation becomes quite vital for the maximal use of available data. Inclusion of operational indicators to administrative data is essential. Unifying all indicators might be impossible but for tracking purposes especially across all levels – national, state, LGA and even ward; a narrower set of indicators needs to be compiled with common denominators and numerators. Also, while data is collected routinely by sectors, a coordinator is needed, such as Federal Ministry of Budget and National Planning or the National Bureau of Statistics. This coordinator will have the mandate for monitoring progress and using data for strategy and policy refinement. To function optimally, nutrition data value chain requires stakeholders' support; they need to be enshrined in the respective sectoral policies to bolster their sense of legitimacy, and they also require financial support for operating costs.

OD3

Nutrition Data from Multiple Surveys in Nigeria: How Consistent?

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Keywords: Nutrition, data, survey, consistency.

BACKGROUND AND OBJECTIVES:
Data gap poses a serious challenge in assessing progress in meeting global targets for reducing the rate of malnutrition in all its forms and nutrition data revolution was suggested (1). Unfortunately, there appears to be poor coordination in nutrition data collection in Nigeria. This study aimed to compare data on nutritional status of children as reported in the recent Nigeria Demographic Health Survey (NDHS 2018), National Nutrition and Health Survey (NNHS 2018), and Multiple Indicator Cluster Survey (MICS 2017) to assess consistency as a partial measure of the strength of nutrition information system.

MATERIALS AND METHODS:
Data on the nutritional status of children under five years were extracted from the recent surveys (2, 3, 4). The data extracted were compared and differences were observed.

RESULTS AND DISCUSSION:
Stunting, wasting and underweight prevalence in Nigeria as reported in the recent MIC, NDH, and NND Surveys are summarized in Figure 1. There is difference of 5 to 12% for stunting, 4 % for wasting and 2 to 12 % for underweight when data from MICS, NDHS and NNHS published in the year 2018 were compared.

Sampling, sample size and other methodological issues could be part of the possible causes of the discrepancies observed.

These results imply inconsistencies in the nutrition data of the same indices published in the same year by different surveys. It is worthy of note that the Global Nutrition Report of the year 2020 reported data from MICS 2017 (published in 2018) as Nigeria's profile. The results further suggest poor coordination among stakeholders responsible for nutrition data generation and dissemination in Nigeria.

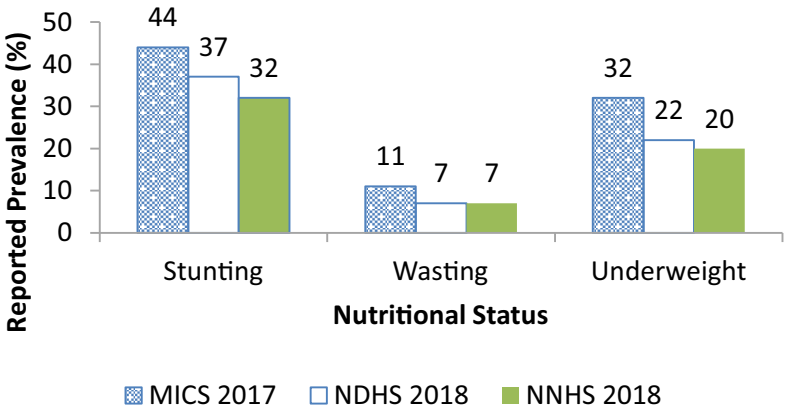

Figure 1. Prevalence of stunting, wasting and underweight as reported by the MICS 2017, NDHS 2018 and NNHS 2018.

CONCLUSION AND RECOMMENDATION:

Surveys reporting nutritional status indices appears to be poorly coordinated in Nigeria posing a serious challenge on data credibility and acceptability. The need for harmony in the conduct and reporting data on nutritional status in national surveys is strongly recommended. In addition, the need for a robust, well coordinated nutrition information system cannot be overemphasized.

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OE1

A Comparison of Response Rate in Web-based and Paper Based Method of Data Collection in Nutritional Survey

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KEYWORDS: Response Rate, Web-based, Paper-based, Nutritional survey.

BACKGROUND AND OBJECTIVES

Web-based or online method of data collection is an advancement over paper-based method of data collection. This method of data collection has been purported to be a means of collecting data from large sample groups within a very short time with minimal cost (1). However, creating a survey online may be significantly costly and require specialized knowledge (2). In contrast to paper based method of data collection, web based questionnaire can be created either with the aid of smart phone applications or computer software and distributed in few hours to a large number of people via e-mail, smart phone application (WhatsApp) and social network (Facebook etc.). The web based method of data collection is easier and convenient to use than paper based method of data collection, but there is a need to evaluate the respondent's response rate to this method in nutrition survey. Thus, the present study evaluates the response rate of the respondents in a study conducted on nutrient intake and food consumption pattern using a web-based and paper-based method of data collection.

METHODOLOGY

The study was conducted among the students of The Federal Polytechnic Ilaro, Ogun state, and involved two hundred and fifty (250) students randomly selected from the institution. The respondents were divided into two groups; paper based group (125) and web based group (125).

A semi-structured paper based and interviewer administered questionnaire comprises of four sections (socio-demographic/economic characteristics, food habit, 24-hour dietary recall and food frequency questionnaire) was designed. Likewise, web-based self-administered questionnaire containing the same information was designed using a smart phone application (survey heart form app). The paper based questionnaire was administered among the paper based group while the web link of the web- based version of the questionnaire was forwarded to the web based group via smart phone application (WhatsApp). The web based questionnaire was structured in such a way that the introductory page, which will lead the respondent to the question will be opened when the web link is clicked. Also, a reminder message was sent to the web based group daily for the period of two weeks. The response rate of the two groups of respondents was calculated using American Association of Public Opinion Research (AAPOR, 2016) response rate calculator (3). Response rate according to AAPOR has six definitions (RR1-6) and the general consensus in academic surveys is to choose one of the six definitions. The response rate 1, 2 and 3 was used in the present study.

Table 1: Response rate of the respondents based on the mode of data collection

Mode of data collection	Sample size (N)	Responses	Response rate 1	Response rate 2	Response rate 3
Paper based	125	98	78.4%	100%	78.4%
Web based	125	54	43.2%	62.4%	43.2%
Total	250	152	60.8%	81.2%	60.8%

Table 1 presents the response rate of the respondents based on the mode of data collection. Response rate 1 (RRA) also known as the minimum response rate (The number of complete interviews divided by the number of interviews (complete plus partial) plus the number of non-interviews (refusal and break-off plus non-contacts plus others) plus all cases of unknown eligibility (unknown if housing unit, plus unknown, other) was higher among the paper based group (78.4%) than the web based (43.2%) of the respondents. Response Rate 2 (RR 2), that is, RR1 plus counting partial interviews as respondents was 100% for the paper based group while the web based group had the response rate of 62.4%. Also, Response rate (RR 3) which estimates the proportion of unknown eligibility that is actually eligible for the study was also higher among the paper based (78.4%) respondents than web based (43.2%) respondents. In RR 3, those respondents estimated to be ineligible are excluded from the denominator.

Furthermore, the total response rate (RR 1, 2 and 3) of the respondent in the present study was 60.8%, 81.2% and 60.8% respectively. These response rates are higher than the values recorded by (4, 5). Also, the response rate of the web based survey in the present study is low compare to the paper based study. This is in contrary to the findings of (5). The reason for this difference may be in the benefit the survey rendered to the respondents. In the case of Converse *et al*., (5) respondents were completing an evaluation instrument in which there was a possibility of personal benefit.

CONCLUSION AND RECOMMENDATION

Conclusively, though web based method of data collection has been said to be easier in use than the paper based method, but the respondent response rate to this method in nutritional based study was found to be very low. Studies aimed at identifying the contributing factor to this should be conducted.

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OE2

Effect of Processing on the Proximate Composition and Antioxidant Components of Tomato(Lycopersicon esculentum)

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KEYWORDS: Tomato, processing, Proximate, Antioxidant

BACKGROUND AND OBJECTIVE

Tomato (*Lycopersicon esculentum*) is one of the most important vegetables worldwide. It is economically attractive and contributes to a healthy, well-balanced diet (1), as it is rich in minerals, vitamins, essential amino acids, sugars and dietary fibres. It can be processed into different products including: Ketchup, puree, powder and juice. As it is a relatively seasonal crop and gives a high yield, this poses challenges in food security in Nigeria. The quality of the processed tomato product is dependent upon processing conditions. It is important for tomato processors to know how to obtain high products to prevent loss of flavor and nutritional quality (2). Hence, this study was to determine the effect of thermal and non-thermal processing on the proximate composition and antioxidant components of *L. esculentum* and to ascertain which processing method and conditions most favorable for processing.

MATERIALS AND METHODS:

Mature, ripe and fresh *L. esculentum* were harvested from a farm at Kunkumi Markafi LGA Kaduna State, Nigeria and identified at the herbarium laboratory, Botany department Ahmadu Bello University Zaria, with a voucher number 1991862. The fruits were sorted, cleaned and divided into seven partitions for the raw (unprocessed), thermally processed (TP) at 70 °C, 80 °C, and 100 °C, non-thermally processed (NTP) at 250 Mpa, 300 Mpa and 350 Mpa. The samples were analyzed for their proximate composition, according to the method of Association of Analytical Chemists (3) and their antioxidant components according to the methods described by (4,5).

RESULTS AND DISCUSSIONS

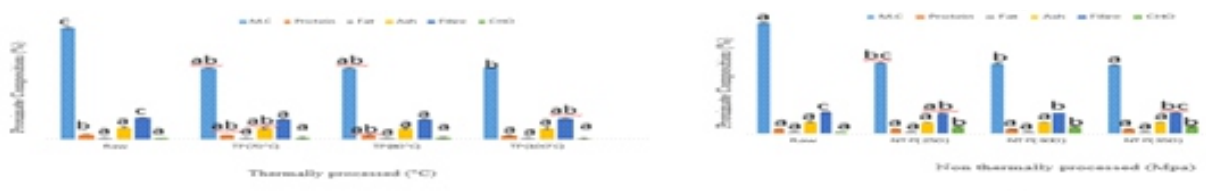

Figure 1;Effect of thermal and non- thermal processing on the proximate Composition of *L. esculentum*. Data are mean ± SD (n=3). Different letters within the same type are significantly different at P≤0.05.

Parameters(mg/100g)	Raw	TP (70°C)	TP (80°C)	TP (100°C)
Lycopene	$19.52^{c}\pm1.83$	$13.08^{b}\pm0.39$	$10.37^{a}\pm0.18$	$10.13^{a}\pm0.08$
β-carotene	$3.96^{c}\pm0.04$	$2.98^{b}\pm0.04$	$2.95^{ab}\pm0.05$	$2.80^{a}\pm0.16$
Vitamin C	$25.33^{bc}\pm0.47$	$24.17^{bc}\pm0.47$	$22.47^{ab}\pm0.84$	$18.07^{a}\pm0.60$
		NTP (250Mpa)	**NTP (300Mpa)**	**NTP (350Mpa)**
Lycopene	$19.52^{a}\pm1.83$	$19.56^{a}\pm0.72$	$19.78^{a}\pm0.60$	$19.79^{a}\pm0.16$
β-carotene	$3.96^{a}\pm0.04$	$3.98^{a}\pm0.04$	$3.99^{ab}\pm0.05$	$4.20^{c}\pm0.16$
Vitamin C	$25.33^{bc}\pm0.47$	$25.77^{c}\pm0.25$	$26.03^{c}\pm0.15$	$27.00^{c}\pm0.17$

Values are Mean ± SD (n=3). Values in the same row with different superscripts are significantly different (P≤ 0.05).

CONCLUSION AND RECOMMENDATION

Non-thermal processing increases the proximate composition and the antioxidant components of *L. esculentum* with increasing atmospheric pressure, this will therefore be a better method to be used in the food industry.

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PE3

Drone Technology in Data Collection for Nutrition Survey.

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KEYWORDS: Drone technology, data collection, Nutrition Survey,

BACKGROUND/ACTIVITIES:
Drones are made up of propulsion system, an airframe and a navigation system, they are part of the variety of mini-aircraft supporting tools that are used for different purposes which includes assimilation of data, storing and for surveillance. The smart device is currently used in Agriculture, health and security sectors which makes data collection and detection of problems easier (Unmanned aircraft system,2017) .A study postulates that having unmanned aerial system incorporated into (Network attached storage) will give a spontaneous growth and this will reach $82.1billion by 2025 and it will create job opportunities for more researchers, this simply means that it will not displace human from work rather it will make research and data collection easier(Gupta *et al.*,2013). In an emerging world of technology, drone has been confirmed as a potential means of improving the data collection especially during nutrition interventions in rural areas and during nutrition emergencies (Hall *et al.*, 2014).Data collection involves gathering of information of interest in a systematic way that enables researchers to extract their stated test objectives, hypotheses, implementation and evaluate the outcome (Syed, 2016). Drones are capable of getting vital data at a low cost with high accuracy than mobile and human data collection method, Agriculture, health, finance and most field of study have fully adopted the drone technology , which has made them achieve their goals faster

OBJECTIVES OF STUDY:
The main objective of the study is to know the importance of drone technology in nutrition survey

(1) To improve nutrition survey
(2) For accurate data collection
(3) To provide excellent data collection services using artificial intelligence
(4) To store data safety for future purposes

Materials /methods: This is a systematic review, the material used was extracted from wide range of literatures, research works and search engines.

CONCLUSION :
Drones are weapon of accuracy and to get the best data during survey it should be adapted in the National agenda, the review shows that research on drone technology in nutrition have not been harnessed, utilizing it will help researchers to have accurate data that will facilitate easy nutrition intervention for positive outcome in fighting malnutrition. The act of using drone technology will give accurate data collection and data storage and this will reduce human labor in researches.

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SUB-THEME F: STRENGTHENING MDAS-ACADEMIA -INDUSTRY LINKAGES FOR DEMAND-DRIVEN NUTRITION DATA GENERATION AND PRIORITIZATION

OF2

Programmes and Academia Partnership Increased Faculty and Student Capacity while Reducing Research Costs

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KEYWORDS: Implementation research, capacity development, evaluation

BACKGROUND AND OBJECTIVES:

Transform Nutrition West Africa (TNWA) research found limited contextual evidence generated for Nigeria, to guide implementation of interventions and increase progress on achieving World Health Assembly 2025 nutrition targets. Nutrition research networks were weak and cross-institutional collaboration among national stakeholders or with international stakeholders were limited. International organizations carrying out research in developing countries need to pay greater attention to research capacity development. Yet, resource limitations restrict the extent to which such efforts have been considered. It is therefore important to find low cost approaches for the needed capacity strengthening.

This study documents deliberate effort used in implementing TNWA Stories of Change research (SoC) in Nigeria as a capacity strengthening entry point. SoC used mixed methods, was conducted through partnership between TNWA and University of Ibadan (UI) and engaged nutrition faculty members (2) and M.Sc. students (2). One faculty member was engaged as a consultant and the second on thesis supervision for the students. This study's objectives were to assess the process, achievements, and challenges of capacity strengthening in such a setting; and suggest this as a low-cost approach for creating successful research partnerships.

MATERIALS AND METHOD:

The study utilized process tracing method, using an ethnographic retrospective approach. Process tracing is a qualitative tool for conducting case studies to identify causal links to an outcome. The method was suitable because it is designed for in-depth single-case studies, where the single case can be a person, a group, an event, or a community. Specifically, the 'theory building' variant of process tracing was used, to allow results to be generalizable beyond the case studied (1). The study aimed to identify linkages between nutrition programmes-academia collaboration, and increased research capacity.

RESULTS AND DISCUSSION:

For capacity strengthening, the global TNWA team supported the UI team to conduct decomposition analysis of stunting changes in Nigeria Demographic and Health Surveys; social network analysis of nutrition stakeholders; multisectoral policy review; and interviews from federal to community levels. UI students served as research assistants on the project and were trained to conduct policy reviews, interviews,

transcription, and analysis of qualitative data using software. Use of statistical software was also included in the training. Thesis research questions for students were identified and integrated to contribute to the SoC data collection and avoid additional costs to the planned research process.

Incorporation of students in the SoC saved costs compared to usual approaches. Staff self-reported that the approach directly impacted on the ability of faculty to use new research methods associated with the project and incorporated the methods in their teaching. The students' experience as research assistants increased their desirability to employers. By the end of the project, one student had been employed in the development sector to provide research support to field activities. The second student had been interviewed for a similar role.

Process tracing revealed that the partnership increased faculty and student capacity through learning and mentorship opportunities created by the project. Regular supportive feedback further helped to reinforce knowledge and skills acquisition. Causal factors identified reflect the Social Cognitive Theory, which posits that environmental, cognitive, and behavioural factors all determine behaviour (in this case research skills acquisition).

CONCLUSION AND RECOMMENDATION:

Nutrition interventions and research programmes provide windows of opportunity for capacity strengthening. There should be greater attention to capacity strengthening within such programmes, even when budgets are limited, so that these windows are not missed.

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OH2

Anthropometric, serum zinc and vitamin A status of secondary school adolescents in Udenu local Government Area, Enugu state, Nigeria.

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Keywords: anthropometry, adolescents, serum zinc, vitamin A.

BACKGROUND AND OBJECTIVES:
Due to increasing nutritional demands for rapid growth and inappropriate eating habits, prevalence of malnutrition is observed to be high in adolescents, which affects their growth and development. Lack of data on the nutritional status of adolescents in the study area is a challenge to nutrition intervention planning and implementation. The objective of this study was to assess the anthropometric, serum zinc and vitamin A status of secondary school adolescents in Udenu Local Government Area, Enugu state, Nigeria.

MATERIALS AND METHODS:
The study employed a cross-sectional descriptive survey design. A total of 344 participants were randomly selected out of 1032 adolescents attending secondary schools within the study area. Five schools were randomly selected out of 10 government schools in the study area. Proportionate sampling method was used to select participants from each school. The data collection methods employed were questionnaire, anthropometric measurements and blood analyses. Data were analyzed using the statistical software

Table 1. Anthropometric indices of the participants according to sex

Variables	Male Freq. (%)	Female Freq. (%)	Total Freq. (%)
Height-for-age			
Normal	136(88.3%)	178(93.7%)	314(91.3%)
Moderate stunting	11(7.1%)	10(5.3%)	21(6.1%)
Severe stunting	7(4.5%)	2(1.1%)	9(2.6%)
Total	**154(100.0%)**	**190(100.0%)**	**344(100.0%)**
$\chi^2 =$ 4.728 df = 2 P-value = 0.094			
BMI-for-age			
Overweight	5(3.2%)	1(0.5%)	6(1.7%)
Normal	142(92.2%)	179(94.2%)	321(93.3%)
Moderate thinness	5(3.2%)	10(5.3%)	15(4.4%)
Severe thinness	2(1.3%)	0(0.00%)	2(6%)
Total	**154(100.0%)**	**190(100.0%)**	**344(100.0%)**
$\chi^2 =$ 6.906 df = 3P-value = 0.075			

package, SPSS (version 21).

RESULTS AND DISCUSSION:

The results of the study revealed that more females (55.2%) than males (44.8%) participated in the study. More males were severely (4.5%) and moderately (7.1%) stunted than the females (severely stunted [1.1%] and moderately stunted [5.3%]). However, thinness was observed more in females (5.3%) than in males (4.5%).

The result of the biochemical analysis revealed that majority (75.8%) of the participants had normal serum zinc level while 26.47% of them were zinc deficient. It was observed that 100% of the participants had normal serum vitamin A levels. The pattern of more males being stunted than females observed in this study is similar to the findings of Ayogu et al (1) though their percentages were higher. According to WHO (2) stunting is the result of long-term nutritional deprivation and often results in delayed mental development, poor school performance and reduced intellectual capacity. Even though the prevalence is low (<20%) it is still a cause for concern since stunting has shown to be transgenerational. The zinc deficiency reported in this study is similar to the findings of Mahmoodi and Kimiagar (3) who reported 31.1% of zinc deficiency among junior high school students of Tehran city. The deficiency could be as a result of poor consumption of animal proteins (which are rich sources of zinc) which was observed among the participants.

CONCLUSION AND RECOMMENDATION:

Malnutrition in the form of stunting and wasting exist among the study participants. These are indications of chronic and acute undernutrition which are capable of endangering their health and cognitive performance. High level of zinc deficiency was observed in the study area and could compromise their immunity and put them at risk of several diseases if left unchecked. Nutrition education with emphasis on consumption of animal proteins and appropriate combination of local staples to improve the adequacy of their diets is recommended.

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OH3

Functional Properties of Germinated Brown Finger Millet Complemented with Bambara-nut Protein Concentrate and Carrot Flour

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KEYWORDS: Functional properties, brown finger millet, bambara-nut protein concentrate

BACKGROUND AND OBJECTIVES:
The functional properties of germinated brown finger millet are the fundamental physico-chemical properties that reflect the complex interaction between the structure, molecular components, and composition and physico-chemical properties of food components (1). The knowledge of the functional properties will be useful in new product development and its application in the preparation of complementary foods, composite flour and baked products. Therefore, the study examined the functional properties of germinated brown finger millet complemented with bambara-nut protein concentrate and carrot flour.

MATERIALS AND METHOD:
Brown finger millet, bambara-nut and carrot roots were purchased from Kure Ultra-market in Minna, Niger State. The brown finger millet were sorted, washed and then soaked in distilled water for 12hrs, at ambient temperature. The water was changed every 4hrs to avert fermentation. The soaked brown finger millet were distributed on jute bags and allowed to germinate for 24hrs while water was sprinkled on it every 3hrs. After germination, it was oven dried for 12hrs, then milled. Method by (2) with minor alterations was used in the production of bambara-nut protein concentrate. Functional properties was determined according to (3). 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 water absorption capacity of the blends varied from 2.15 to 3.55 g/cm^3, though there was no significant different ($p>0.05$) between blend A and B. However, control was significantly different ($p<0.05$) from the blends. Oil absorption capacity of the blended samples ranged from 1.52 to 3.87 g/cm^3, no significant different ($p>0.05$) across the blends except for control. The gelation capacity varied from 6.00 to 8.00 g/cm^3 with blend B having the utmost gelation capacity. The foaming capacity varied from 5.95 to 11.95 g/cm^3 with blend C having the highest foaming capacity of 11.95 g/cm^3 and blend A having the lowest value. However, there was significant different ($p<0.05$) across the blends. The bulk density varied from 0.26 to 0.60 g/cm^3, there was no significant different ($p>0.05$) across the blends except for control with the least value.

CONCLUSION:
Sample B (65% germinated brown finger millet flour, 10% bambara nut protein concentrate, 25% carrot flour) was the best in respect to functional properties of the formulated blends.

Table 1: Functional properties of the blends and control (commercial product)

Parameter	A	B	C	D
WAC (g/cm^3)	$2.15^c \pm 0.05$	$2.15^c \pm 0.05$	$2.55^b \pm 0.05$	$3.55^a \pm 0.05$
OAC (g/cm^3)	$1.71^b \pm 0.05$	$1.68^b \pm 0.05$	$1.52^b \pm 0.08$	$3.87^a \pm 0.05$
Gelation (w/v)	$5.95^b \pm 0.05$	$7.95^a \pm 0.05$	$5.95^b \pm 0.05$	$5.95^b \pm 0.05$
FC (%)	$5.95^d \pm 0.05$	$9.95^b \pm 0.05$	$11.95^a \pm 0.05$	$7.95^c \pm 0.05$
Bulk density (g/cm^3)	$0.60^a \pm 0.05$	$0.60^a \pm 0.05$	$0.56^a \pm 0.05$	$0.26^b \pm 0.05$

KEYS
A: 60% germinated brown finger millet flour, 10% of bambara nut protein concentrate, 30% carrot flour.
B: 65% germinated brown finger millet flour, 10% bambara nut protein concentrate, 25% carrot flour.
C: 70% germinated brown finger millet, 10% bambara nut protein concentrate, 20% carrot flour.
D: Control (Commercial product).
WAC= water absorption capacity; **OAC**= oil absorption capacity; **FC**= foam capacity.

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OH4

Anthropometric indices of infants and mother's knowledge and practice of exclusive breastfeeding in Abuja Municipal Area Council, Abuja, Nigeria

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KEYWORDS: Exclusive breastfeeding, anthropometric indices, stunting, underweight

BACKGROUND AND OBJECTIVES:
Inappropriate infant feeding practice leads to malnutrition which is a significant cause of morbidity and mortality, particularly in developing countries (1). In Nigeria, nearly 3 in 10 (29%) children under six months are exclusively breastfed (2) despite the benefits of optimal breastfeeding practices. This study assessed the anthropometric indices of infants and mother's knowledge and practice of exclusive breastfeeding.

MATERIALS AND METHODS:

A cross-sectional study in which 385 mother-infant pair attending post-natal clinics at primary health care centres in Abuja Municipal Area Council (AMAC), Abuja, Nigeria, constituted the study sample size. Multi-stage sampling technique was employed in selecting respondents for the study. Structured, validated questionnaire was used for data collection and anthropometric measurements were taken. Data was analysed using IBM SPSS for windows version 22. Data were presented as frequencies, percentages, means and standard deviation. Association among variables was determined using chi-square. Bivariate logistic regression was used to identify factors associated with the practice of exclusive breastfeeding. Accepted level of significance was $p < 0.05$.

RESULTS AND DISCUSSION:

More than half (54.0%) of the mothers had excellent knowledge of exclusive breastfeeding whereas only 34.5% practiced exclusive breastfeeding. The children were stunted (63.1%), underweight (21.0%) and wasted (5.5%). Anthropometric indices of the males differed significantly ($p < 0.05$) from the females. The odds of practicing exclusive breastfeeding was high among mothers who were educated (COR = 3.077; 95%CI = 1.456 – 6.502), had good knowledge of exclusive breastfeeding (COR =3.218; 95%CI = 1.789 – 5.788), had normal delivery (COR = 2.435; 95%CI = 0.529 – 0.856), had previous breastfeeding experience (COR =1.667; 95%CI = 0.963 – 2.885), parity of < 3 (COR =1.433; 95%CI = 0.938 – 2.190) and were employed (COR =1.243; 95%CI = 0.722 – 2.141).

CONCLUSION AND RECOMMENDATION:

The children were undernourished and exclusive breastfeeding was practiced by few mothers. Primary health care centres should adopt the multi-tiered Baby-Friendly approach to support, promote and protect exclusive breastfeeding.

Table 1: Anthropometric indices of the infants by sex

Variables	Males (n = 219)		Females (n = 166)		Total (n = 385)		χ^2	p-value
	F	%	F	%	F	%		
Weight-for-age								
Underweight	58	26.4	23	13.8	81	21.0	11.719	0.008*
Normal	130	59.4	125	75.3	255	66.2		
Over weight	31	14.2	18	10.8	49	12.7		
Total	**219**	**100.0**	**166**	**100.0**	**385**	**100.0**		
Length-for age								
Stunted	148	67.6	95	57.2	243	63.1	11.939	0.003*
Normal	71	32.4	71	42.8	142	36.9		
Total	**219**	**100.0**	**166**	**100.0**	**385**	**100.0**		
Weight-for-length								
Wasted	11	5.1	10	6.0	21	5.5	10.564	0.032*
Normal	89	40.6	81	48.8	170	44.2		
Overweight	40	18.3	39	23.5	79	20.5		
Obesity	79	36.1	36	21.7	115	29.9		
Total	**219.0**	**100.0**	**166**	**100.0**	**385**	**100.0**		

*= P <0.05 is significant

Table 2: Factors associated with the practice of exclusive breastfeeding (EBF)

Variables	Practiced EBF		COR	95% CI	p-value
	Yes F (%)	No F (%)			
Age of mother (years)					
Adolescent (10- 19)	1 (0.8)	12 (4.8)	0.152	0.019 - 1.178	0.038*
Adult (>20)	132 (99.2)	240 (95.2)			
Mothers education					
Educated	124 (93.2)	206 (81.7)	3.077	1.456 - 6.502	0.002*
Uneducated	9 (6.8)	46 (18.3)			
Parity of mothers					
≥3	64(48.1)	99 (39.3)	1.433	0.938 - 2.190	0.095
<3	69 (51.9)	153 (60.7)			
Income (₦)					
Low (<50,000)	106 (79.7)	234 (92.9)	0.302	0.159 - 0.572	0.000*
High (≥50,000)	27 (20.3)	18 (7.1)			
Employment					
Employed	110 (82.7)	200 (79.4)	1.243	0.722 - 2.141	0.431
Unemployed	23 (17.3)	52 (20.6)			
Delivery type					
Normal	98 (73.7)	193 (76.6)			0.601
C-section	35 (26.3)	58 (23.0)	2.435	0.529 - 0.856	
Previous breast feeding experience					
Experienced	112 (84.2)	192 (76.2)	1.667	0.963 - 2.885	0.066
Inexperienced	21 (15.8)	60 (23.8)			
Exclusive breastfeeding knowledge					
Good knowledge (70- 100%)	117 (88.0)	175 (69.4)			
Poor knowledge (≤69%)	16 (12.0)	77 (30.6)	3.218	1.789 - 5.788	0.000*

COR= Crude odds ratio, CI= confidential interval, EBF= Exclusive breastfeeding

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OH5

Breastfeeding Knowledge, Attitude And Barriers Among Nursing Mothers In Ado-odo/ota Local Government Area of Ogun State.

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KEYWORDS: Breastfeeding, Knowledge, Attitude, Barriers

BACKGROUND:

The choice to breastfeed is greatly dependents on the mother's breastfeeding knowledge and attitude which are normally established in their early childhood (2). Despite strong evidences in support of exclusive breastfeeding, its prevalence remains low worldwide.

OBJECTIVE:

This is to assess the breastfeeding knowledge, attitude and barriers among nursing mothers.

METHODS:

The breastfeeding knowledge, attitude and barriers of 341 nursing mothers of children aged 0-24months in Ado-Odo/Ota Local Government Area of Ogun State, Nigeria was assessed with a validated breastfeeding knowledge, attitude and barrier questionnaire (KAB). Knowledge on exclusive breastfeeding (EBF), attitude towards EBF and barriers towards EBF. Items for the knowledge, and attitude of EBF scales of the questionnaire were developed by the researchers based on the WHO and UNICEF breastfeeding recommendations for optimal infant feeding (Sobti et al, 2002; WHO, 2009a) as well as on previous research that had similar objectives (Mahmoud, 2012) while breasting barrier was assessed using breast feeding barrier questionnaire based on identified breastfeeding barriers in literature (Saied et al, 2013).

RESULTS AND DISCUSSION:

The nursing mothers studied were mostly (35.8%) within the age of 30-35years while 30.5% were above 35years. Exclusive breastfeeding was practiced by 78.3% mostly (48.1%) for the first 6months of life. The higher exclusive breastfeeding rate could be because majority of the nursing mothers (87.7%) believed breastfeeding alone was sufficient for the first 6months of life. The women had good breastfeeding knowledge which is similar to other Nigerian studies (1). Seventy-eight percent (78%) agreed that babies should be breastfed immediately after delivery, 18.5% disagreed that breastfeeding in public is embarrassing. About half of the women demonstrated positive attitude to breastfeeding attributed to age and duration of experience. The decision to breastfeed is highly dependent on the attitude towards breastfeeding which are formed as early as adolescence and early adulthood (2). Many barriers exist for mothers who wants to breastfeed (3). In this study, the mothers cited the transfer of disease to baby (71%), embarrassment from breastfeeding in public places (63.6%), while 42.5% fear the sagging of breast. The issue of barriers was corroborated by Brownell *et al* (4) in which embarrassment remains alarming. There was significant relationship ($p = 0.05$) between breastfeeding knowledge, attitude and barriers.

Table 1: Breastfeeding Knowledge of Respondents

Variables	Frequency	(%)
Exclusive Breastfeeding		
Yes	267	78.3
No	74	21.7
If yes, how long?		
0-3months	103	30.2
0-6months	164	48.1
Involvement in breastfeeding discussion		
Yes	282	82.7
No	59	17.3
Colostrum is important for babies?		
Yes	327	95.9
No	14	4.1
Total	**341**	**100**

CONCLUSION AND RECOMMENDATION:

The nursing mothers exhibited an excellent breastfeeding knowledge regarding its health benefits and demonstrated an averagely positive attitude however they are faced with several barriers which might hinder them from breastfeeding. Thus nursing mothers should be supported by family members to practice EBF and health care providers should strengthen their enlightenment of the public on its perceived benefits.

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OH6

Prevalence of Malnutrition among Mothers and Children 0-6 Months In Jos And Jigawa State Nigeria, A Comparative Analysis.

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KEYWORDS: Maternal-child malnutrition, under 6 months children, SAM and MAM, Northern-Nigeria.

BACKGROUND AND OBJECTIVE:

Poor nutritional status of mothers has direct and indirect influence on their health and of their children.[1] Adequate maternal nutrition is needed for breastfeeding, recovery following pregnancy and labour as well as coping with child care.[2] About 4.7 million infants globally, less than 6 months of age (U6M) are moderately wasted and 3.8 million are severely wasted[3]. This study therefore examined the prevalence of maternal and child malnutrition in Jos, Plateau and Jigiwa, states, Nigeria.

MATERIALS AND METHODS:

A cross-sectional study of 380 mother-child pairs 0-6 months of age attended to at Jos University Teaching Hospital and Federal Medical Centre Birnin Kudu paediatric outpatient departments and immunization clinics were recruited and studied. Data were collected using semi-structured researcher administered questionnaire. Weight, height and length were measured using a digital weighing scale for weight, height meter for height and infantometer for length. Z scores of the infants were derived using WHO Z score charts. Data were analyzed using IBM SPSS Statistics, version 21.

RESULTS AND DISCUSSION:

Of the mothers 68.6%, 22.6% and 8.8% were of lower, middle and higher socioeconomic status (SES) respectively. Most mothers (82.8%) were within 24-34 years of age.

Results showed mothers' mean age (28.05±5.71), weight (64.20±14.22kg), height (1.59±0.07metres), and BMI (25.30 ±5.50 kgm^{-2}) respectively. Mothers in Jos were significantly older (29.19±5.39) than those in Jigawa (26.27±5.77). Mothers studied in Jos were heavier (69.93±13.96kg) compared with Jigawa 55.43±9.30kg ($p<0.05$).

Prevalence of maternal malnutrition was undernutrition, 6.0%; overweight, 27.4%; and obesity, 20.6% respectively. Significantly more mothers in Jigawa had undernutrition (11.4%) than those in Jos (2.4%). No mother in Jigawa was obese but 34.3% of mothers in Jos were obese.

The mean age of the children was 3.15±1.33. Amongst them, 53.2% were males and 46.8% were females.

Prevalence of SAM and MAM found in this study was 9.8% and 9.0%. Males were more wasted (20.2%), underweight (33.1%) and stunted (35.3%) than the females 17.7%, 26% and 29.8%. According to study areas, significance difference exists ($p<0.01$). Prevalence of SAM was 2.2% in Jos and was 22.4% in Jigawa. Infants in Jigawa were more severely stunted (38.4%) and severely underweight (36.7%) as against those in Jos 6.9% and 3% respectively.

The result showed maternal undernutrition increased prevalence of severe acute malnutrition among the infants in this study.

Table 1: Relationship between maternal BMI categories and child nutritional status

Maternal BMI	WFL SAM	MAM	Normal	P value
Obese	1(1.4)	3(4.2)	68(94.4)	0.000*
Overweight	6(6.3)	7(7.3)	83(86.5)	
Normal	25(15.7)	21(13.2)	113(71.1)	
Underweight	4(19.0)	0(0)	17(81)	

*** Statistically significant**

CONCLUSION AND RECOMMENDATIONS:

Undernutrition was high among the mothers (Jigawa, 11.4% and Jos, 2.4%) and their infants (SAM, 22.4% in Jigawa and 2.2% in Jos) respectively. This study shows that maternal nutrition influences nutritional status of the under 6 month's population of infants. There is need for improved nutritional status among mothers prior and during pregnancy as well as after delivery for optimal health as it determines the health and nutritional outcomes of their infants.

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OH7

Chemical Composition and Sensory Evaluation of White Maize-based Complementary Food Fortified with African Palm Weevil Larvae and Beetroot.

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KEYWORDS: Entomophagy, African palm weevil larvae, complementary food

Background and Objective:
Cereal-based complementary foods are characterized by low protein quality contributing to high prevalence of undernutrition among children. The Consumption of edible insects (entomophagy) has led to diet diversity and improving nutrient quality. The objective of this study is therefore to evaluate the chemical composition and sensory evaluation of white maize-based complementary food fortified with African palm weevil larvae and beetroot.

Materials and Methods: White maize and beetroot were obtained from the market in Abia state while African palm weevil larvae was obtained from a farm in Delta state. The white maize was processed into gruel form. The African palm weevil larvae and beetroot were processed into flour form and was then added into the white maize in different ratios giving samples LMB (50% white maize, 40% larvae, 10% beetroot), BLM (50% white maize, 30% larvae, 20% beetroot), MLB (60% white maize, 20% larvae, 20% beetroot) and MOO (100% white maize, 0% larvae, 0% beetroot). White maize served as control. Proximate composition, vitamin and mineral contents of the pap were analyzed using standard methods while sensory properties were evaluated using 9-point hedonic scale. Data was analyzed using analysis of variance while LSD was used to compare means of $p<0.05$ level of significance.
Results and Discussion: The Fortified samples had higher protein content LMB (12.90g), BLM (11.43g) and MLB (10.63g) compared to the control MOO (8.51g). Energy content of the fortified samples LMB, BLM and MLB, are (252.49kcal), (242.00kcal) and (192.37kcal) respectively higher than the MOO 102.22kcal. Sample MOO was preferred more for sensory attributes.
Conclusion: Pap sample of LMB compared favorably in protein and energy content than sample MOO and in combatting protein-energy malnutrition.

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OH8

Assessment of Micronutrient Status of Pregnant Women Attending Antenatal Care at Barau Dikko Teaching Hospital, Kaduna.

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KEYWORDS: Pregnant women, Micronutrients, Nutritional Status.

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BACKGROUND AND OBJECTIVES:

Pregnancy is often affiliated with continuous and recurrent changes in metabolic demand and physiological status of women. Nutritional status assessment is a critical component of the nutritional care because adequate nutrition is needed to sustain the mother as well as for the development of the foetus. This study seeks to assess nutritional status and micronutrient status (Iron, Zinc, Selenium, Copper and Vitamin A) of pregnant women attending antenatal care at the Barau Dikko Teaching Hospital Kaduna state, Nigeria.

MATERIALS AND METHODS:

150 pregnant women in different trimesters were sampled by stratified random sampling. Anthropometric assessment was used to determine nutritional status. Established methods for quantitative determination of Serum Vitamin A, Serum Zinc, Serum Copper, Serum Selenium and Serum Ferritin were used in determining pregnant women's micronutrient status. Relationships among micronutrient status and dietary pattern of the pregnant women were determined by Chi square.

RESULTS:

Demographic characteristics revealed the pregnant women were mostly aged between 28 to 31 (24.7%). Majority of the pregnant women were in their second trimester (53.3%). Prevalence of Severe Acute Malnutrition was 63.0% while Moderate Malnutrition was 16%. 63.3% of the pregnant women had suboptimal levels of Vitamin A. 68.9% were severely deficient in Zinc, 43.3% were deficient in selenium, 7.8% were deficient in copper and 86.7% were deficient in Iron. Pearson's correlation analysis among the pregnant women's micronutrient status showed significant association between the Iron and Vitamin A concentrations as well as between Copper and Iron concentrations.

CONCLUSIONS:

The prevalence of vitamin A and Iron deficiency in pregnant women was very high despite the supplementation, this indicates a serious public health issue. Iron deficiency in pregnancy is often associated with aneamia, which in turn increases the rate of maternal morbidity and mortality. The study also observed that there was a significant correlation between vitamin A and Iron status as well as negative correlation between copper and iron status in pregnancy. The fact that majority of the women resumed antenatal care in their 2nd and third trimester, could also indicate that they didn't start supplementation on

time coupled with diets deficient in iron and vitamin A may have affected the suboptimal levels of these micronutrients during pregnancy.

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OH9

Analyzing Food Consumption Pattern, Dietary Diversity and Coping Strategy of Farm Families in Kogi State, Nigeria

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KEYWORDS: Consumption, diversity, diet and shocks

BACKGROUND AND OBJECTIVES:

It is estimated that close to 1 billion people in the world suffer from hunger and food insecurity, defined as not having enough calories to live a healthy life (IFPRI 2020). Household food insecurity is directly influenced by low access to food. Consequently, households that do not have sufficient access to food have low dietary diversity, reflecting poor nutrient adequacy. Dietary diversity is the number of different foods or food groups consumed by the household over a reference period not regarding the frequency of consumption (Hoddinott and Yohannes, 2002). There is a decreasing productivity of agricultural output which is a major livelihood option for rural households as a result of climate change impacts, rising conflicts and other economic shocks. In the face of minimal coping strategy, there is expected increase in the vulnerability of farm households to food insecurity. This study examines dietary status of the farming population who have always been believed to be food secured from farming outputs.

Specifically, this study examined the food consumption pattern of the farm families; determined the level of household dietary diversity; and analyzed the level of coping strategy to prevailing economic shocks

MATERIALS AND METHODOLGY:

Cross-sectional data obtained from a baseline survey was employed in this study. A sample of One hundred and ninety two households selected from the four agricultural zones in the State were interviewed using a structured questionnaire. Data obtained was analyzed using a combination of descriptive statistics; food consumption score (FCS) index; household dietary diversity score (HDDS) index and coping strategy score

(CSS) index.

RESULTS AND DISCUSSION:

Results from the food consumption analysis shows a mean score 51.4 with majority of the households well above the 35 borderline score. The average household dietary diversity score was observed to be 6.91, an indication of good dietary diversity among the households. In terms of coping strategy, the households were observed to fairly cope with economic shocks and the mean score of the index was 23.92. The implication of the results is that the farm households in the study have largely been food secured with a good level of diversity in their dietary combinations. In addition, in the face of observed climatic and economic shocks, the households have remained resilient and have fairly coped.

CONCLUSION:

In spite of the obvious climatic and economic shocks rural households engaged in agriculture have demonstrated significant resilience with varying coping strategies. The households have remained food secured with a good level of diversity in their diets. This could be attributed to indigenous coping strategies adopted by the farming households.

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OH10

Metabolic Screening for Phenylketouria in Newborn Babies and Provision of Subsidized Phe- Free Formula in Nigerian Hospitals.

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KEYWORDS: *Metabolic Tests, congenital, Newborns, phenylalanine*

BACKGROUND AND OBJECTIVE

Without the enzyme necessary to process phenylalanine, a dangerous build-up can develop when the person eats foods that contain protein or aspartame, an artificial sweetener which can eventually lead to serious health problems. This is caused by deficient activity of the enzyme phenylalanine hydroxylase. This disease condition is congenital and an inborn error of metabolism which means recognizing phenylketonuria right away can help prevent major health problems. Newborns with PKU usually don't have or show any symptoms; however, without treatment the babies develop signs of PKU within few months. When these signs arise PKU is already making irreversible changes and damages to the baby. These symptoms can be mild or severe and they include:

- musty odor in the baby's breath, skin or urine caused by too much phenylalanine in the body

- Brain problems that may include seizures
- Skin rashes (eczema)
- Fair skin and blue eyes. This is because phenylalanine cannot transform into melanin the pigment responsible for hair and skin tone
- Abnormally small head (microcephaly)
- Intellectual disability
- Hyperactivity

Newborn screening is the practice of testing newborn babies within 48hrs of life for certain disorders and conditions that can hinder their normal development. An infant whose treatment is started at one month may be expected to develop his full potential, an infant whose treatment commences at two months, will probably have a normal mentality but ten points more or less will be shaved off the potential I.Q. if treatment is delayed until second half of the first year of life, retardation sets in though in most cases, the infant may not need institutionalization (*wilard et.al, November, 1960*). The test is done after the baby is 24hours old and has ingested some protein (breast milk) to ensure accurate results to check for the ability of the infant to digest the amino acid Phenylalanine.

Newborn screening is very relevant as most genetic or molecular dysfunctions in infants do not show any symptoms until irreversible damages occur.

The objective of this review is to:

- Throw more light and create more awareness on the importance of implementation of newborn screening for phenylketouria in order to enlighten health workers, pediatrics, physicians, mothers and every other stakeholder involved on the necessity of this screening.
- To determine the knowledge of this health condition among health workers and dietitians
- To know if the health workers in Nigeria are fully aware of the procedures of managing this disease condition

MATERIALS AND METHOD

The materials used for this review are texts, literatures and journals gotten from various websites and online libraries.

CONCLUSION AND RECOMMENDATIONS

As we take steps to seeing that the implementation of newborn screening for phenylketouria becomes a reality programs in Nigeria hospitals, it is important that;

1. There be a sensitization program for all stakeholder involved in health of infants for them to gain more in-depth knowledge on the disease condition.
2. The subject of this disease condition should be included in the atenatal lessons given to expectant mothers which cover etiology unto management.
3. Most importantly the responsible bodies should make further deliberations and take steps to implement these screenings.

Although PKU is rare, it's important that newborns are required to get a PKU test. The test is easy, with virtually no health risk. But it can save a baby from lifelong brain damage and/or other serious health problems. If PKU is found early, following a special, low-protein/low-Phe diet complications can be prevented.

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OH11

Amino acid profile and microbiological Quality of Complementary Diets from Blends of Fermented Millet (Pennisetum glaucum L),with Groundnut (Arachis hypogeae D) and Moringa oleifera Flours

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KEY WORDS: Millet, Fermentation, Amino acid

BACKGROUND AND OBJECTIVES:

Malnutrition resulting mostly from poor feeding practices of infants and young children is a major public health problem in Nigeria. The use of two or more plant-based food materials (cereal and legume) in the preparation of complementary foods in order to improve the nutritional quality of the food combinations have been proven by various scientific studies (1,2). This study evaluated the amino acid profile and Microbiological quality of flour blends prepared from fermented 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 was 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 fermented millet, groundnut and M. *Oleifera*. The proximate, amino acids profiles and microbiological qualities were determined using standard methods of analysis (3). Data were analyzed using statistical packages, means values separated using Duncan's New Multiple Range (DNMR) test at $P<0.05$.

RESULT AND DISCUSSION:

The amino acid compositions of complementary foods are shown in Table 1. The most abundant amino acid in the formulations is glutamic acid (9.91-13.00 g/100 g) while the least (1.76 – 2.26 g/100 g) concentrated essential amino acids is tryptophan. The results showed that total amino acids (TAA) ranged from 57.02±0.01-89.11±0.05 g/100 g of protein, total essential amino acids (TEAA) 22.77- 38.81 g/100 g of protein, % TEAA/TAA ranged from 38.39 - 44.38%. The results further indicated that the TAA values (57.02 – 89.11 g/100 g of protein) of formulated samples were higher than value (61.56 g/100 g of protein) obtained for ogi except for FMGM5 (57.02 g/100 g) and when compared to the value (87.85 g/100 g of protein) for Cerelac they were lower except for FMGM1 (89.11 g/100 g of protein) which was

higher. This observation agreed with other findings that a single plant-based food, such as Ogi (corn gruel), is usually low in essential amino acids but when combined with legume or other protein-rich food materials, the nutritional quality of the combinations usually improved and better than unfortified single plant-based food product (1, 4).

The mean total viable count of the formulated samples ranged between 1.00 x 10^2 and 2.50 x 10^4 cfu/ g, mean mould/yeast count ranged from 1.20 x 10^1 to 1.80 x 10^2 cfu/g . However, coliform and Escherichia coli were not detected in the formulated samples. This shows that both are fit for human consumption. The total viable count and *E. coli* in all the formulated diets were found to be below the maximum level of 1.0 x10^3recommended by FAO/WHO (5)

CONCLUSION AND RECOMMENDATIONS:

The findings of this work are an indication that the formulated complementary foods have the potential to provide adequately the essential amino acids required by infants for the growth and development. The percentage ratios of TEAA to TAA in the formulated complementary foods were in the range of 38.-55% which is above the 36% considered adequate for ideal protein for infants. Therefore, use of the combination of millet, groundnut and Moringa Oleifera seeds for the management of malnutrition in children should be further explored.

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Table1: Amino Acid compositions (g/100g dry weight matter) of complementary foods from fermented Millet, Groundnut and *M. oleifera* flour blends

Nutrient	FMGM 1	FMGM 2	FMGM 3	FMGM4	FMGM 5	FMGM 6	FMGM 7	CERELAC	OGI	*Children
Non-Essential Amino Acid										
Alanine	5.81^{a} ±0.012	4.33^{d} ±0.12	5.55^{b} ± 0.03	5.01^{c} ±0.00	4.02^{e} ±0.00	3.95^{e} ±0.12	4.02^{e} ±0.00	1.40^{g} ±0.03	3.00^{f} ±0.03	
Aspartic acid	7.01^{b} ±0.01	6.33^{e} ±0.01	6.62^{c} ±0.01	6.20^{d} ±0.01	4.03^{h} ±0.01	4.65^{g} ±0.01	6.27^{e} ±0.12	9.23^{a} ±0.04	5.97^{f} ±0.07	
Serine	4.60^{b} ±0.01	5.00^{a} ±0.01	4.00^{d} ±0.00	3.60^{e} ±0.12	2.54^{h} ±0.12	2.88^{g} ±0.01	3.07^{f} ±0.06	4.31^{c} ±0.01	4.60^{b} ±0.08	
Glutamic acid	12.62^{d} ±0.12	13.00^{c} ±0.01	12.83^{cd} ±0.00	12.64^{e} ±0.02	11.00^{f} ±0.12	10.67^{g} ±0.12	9.91^{h} ±0.06	19.65^{a} ±0.05	16.95^{b} ±0.03	
∑NEAA	30.04±0.01	28.66±0.04	29.00±0.01	27.45±0.04	21.59±0.06	22.05±0.04	23.27±0.01	34.59±0.03	30.52±0.05	
Conditionally essential amino acid										
Proline	4.20^{a} ±0.06	3.30^{c} ±0.12	3.80^{a} ±0.00	2.00^{g} ±0.12	2.26^{f} ±0.12	2.93^{d} ±0.07	3.30^{c} ±0.01	3.35^{b} ±0.03	2.55^{e} ±0.01	
Glycine	3.32^{a} ±0.12	1.64^{c} ±0.01	2.55^{b} ±0.12	1.42^{e} ±0.00	1.05^{f} ±0.12	2.04^{d} ±0.01	2.37^{b} ±0.12	5.97^{f} ±0.07	4.12^{g} ±0.02	
Arginine	7.23^{b} ±0.12	6.03^{d} ±0.01	6.89^{c} ±0.01	5.34^{e} ±0.01	5.30^{e} ±0.29	5.90^{d} ±0.01	6.03^{d} ±0.01	9.13^{a} ±0.07	4.80^{f} ±0.00	
Cysteine	2.41^{a} ±0.12	2.20^{c} ±0.12	2.26^{b} ±0.01	2.10^{d} ±0.07	1.82^{f} ±0.12	1.82^{f} ±0.01	1.95^{e} ±0.00	1.10^{g} ±0.07	0.82^{h} ±0.00	
Tyrosine	3.10^{c} ±0.06	2.75^{d} ±0.01	3.30^{b} ±0.00	3.10^{c} ±0.01	2.23^{g} ±0.02	2.60^{e} ±0.01	2.80^{d} ±0.01	2.33^{f} ±0.02	4.16^{a} ±0.02	
∑CEAA	20.26±0.10	15.92±0.05	18.80±0.03	13.96±0.04	12.66±0.13	15.29±0.02	16.45±0.03	21.88±0.05	16.45±0.01	
Essential amino acid										
Lysine	3.02^{b} ±0.01	2.52^{c} ±0.12	2.70^{c} ±0.00	2.31^{d} ±0.12	2.17^{de} ±0.01	2.02^{ef} ±0.01	2.30^{d} ±0.06	4.09^{a} ±0.07	0.51^{f} ±0.00	6.4
Threonine	4.40^{a} ±0.12	4.01^{c} ±0.01	4.22^{b} ±0.01	3.67^{d} ±0.01	2.94^{e} ±0.01	3.05^{e} ±0.01	3.67^{d} ±0.12	3.83^{cd} ±0.01	1.75^{f} ±0.00	3.7
Valine	5.62^{a} ±0.12	5.33^{a} ±0.32	5.67^{a} ±0.12	4.68^{b} ±0.01	3.33^{d} ±0.01	3.60^{d} ±0.01	4.01^{c} ±0.01	4.72^{b} ±0.06	1.86^{e} ±0.02	3.8
Methionine	2.30^{c} ±0.01	2.10^{d} ±0.01	2.20^{c} ±0.12	2.02^{e} ±0.01	1.71^{f} ±0.01	1.71^{e} ±0.00	1.76^{e} ±0.01	1.71^{b} ±0.06	1.10^{a} ±0.00	2.7
Isoleucine	4.91^{a} ±0.01	3.02^{d} ±0.01	4.00^{c} ±0.00	2.92^{e} ±0.01	2.19^{g} ±0.01	2.36^{f} ±0.01	3.01^{d} ±0.01	4.34^{b} ±0.07	1.33^{h} ±0.02	3.1
Leucine	8.53^{a} ±0.01	7.55^{c} ±0.01	6.59^{d} ±0.01	7.90^{b} ±0.01	3.97^{f} ±0.04	4.70^{e} ±0.01	4.56^{e} ±0.00	4.57^{e} ±0.16	3.51^{g} ±0.02	7.3
Phenylalanine	5.15^{a} ±0.01	4.26±0.01^{d}	4.61^{c} ±0.01	3.90^{e} ±0.00	3.01^{h} ±0.00	3.30^{g} ±0.12	3.02^{h} ±0.00	4.76^{b} ±0.01	3.55^{f} ±0.00	6.9
Histidine	2.62^{a} ±0.01	2.34^{abc} ±0.32	2.50^{ab} ±0.01	2.23^{bcd} ±0.01	1.69^{f} ±0.01	1.92^{def} ±0.12	1.85^{ef} ±0.00	2.11^{cde} ±0.01	0.24^{abc} ±0.00	1.0
Tryptophan	2.26^{b} ±0.12	2.05^{cde} ±0.01	2.21^{bcd} ±0.00	1.81^{f} ±0.12	1.76^{f} ±0.12	1.92^{ef} ±0.00	2.04^{de} ±0.01	1.25^{bc} ±0.00	0.74a±0.01	1.25
TEAAs	38.81	33.18	34.70	31.44	22.77	24.58	26.40	31.38	14.59	
∑AA	89.11	74.76	82.5	73.85	57.02	64.02	67.11	87.85	61.56	
(∑EAA/∑AA)100	43.61	44.38	42.06	42.57	39.93	38.39	39.79	43.63.	23.7	36*

Means (±SEM) with different alphabetical superscripts in the same row are significantly different at P< 0.05 FMGM =Fermented millet + groundnut + *Moringa oleifera* .Key: FMGM1 50%:35%:: 15%, , FMGM2 50%:30%: 20%,, FMGM3 : 55%:25%: 20%, FMGM4: 60%:20%: 20%, FMGM5 70%:10%: 20%,, FMGM6 55%:20%: 25%,FMGM7 55%:15%: 30%, *TEAA: Total Essential amino acid,* ∑AA: Total amino acid, ∑NEAA: Total non essential amino acid, ∑CEAA: Conditionally essential amino acid

*Recommended value (5)

OH12

Prevalence of Malnutrition Among Children Aged 6-59 Months in Kaduna State, Nigeria

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Keywords: Malnutrition; anthropometry; children; Kaduna State.

BACKGROUND AND OBJECTIVE

Malnutrition signifies inadequate, excessive, or imbalanced consumption of nutrients. In Nigeria, 37 per cent of children, or 6 million children, are stunted (chronically malnourished or low height for age), more than half of them severely. The study assessed the anthropometric indices of children from the three senatorial districts in Kaduna State.

MATERIALS AND METHODS:

The study design for the research was a cross sectional descriptive survey. Proportionate sampling technique was used to select 420 children from a population of 1, 172,437 (three senatorial districts in Kaduna State), aged 6- 59 months. The age of the children was determined through their birth certificate and caregivers where there is none. The nutritional status was assessed using a structured questionnaire, anthropometric parameters based on World Health Organization (WHO, year?) classification of malnutrition, mild (weight for height ratio between -1SD to -2SD), moderate (-2SD to -3SD) and severe (less than -3SD), while 24-hour food recall was obtained on the children looking at the breakfast, lunch and dinner. The data obtained was coded and entered into Excel spread sheet and transferred back to SPSS version 16.0 for analysis. Frequency distribution and percentages were used to present anthropometric status of the children.

RESULTS AND DISCUSSION:

Sex distribution of children studied was 53.8% female and 46.2 % male. Anthropometric assessment showed the prevalence of different categories of malnutrition among the children as severe stunting 38.6% moderate stunting 31.4% while 30% of the children were normal. Severe underweight was 41.24%, moderate underweight 35.2% and normal was 23.6% while severe wasting was 21.26%, moderate wasting 26.4% while 51% were normal. Twenty-four (24) hour dietary recall showed the diet of the children is monotonous in nature as it dwells more on maize and maize products.

CONCLUSION AND RECOMMENDATION:

Severe malnutrition exists among children in Kaduna State therefore, there's need for improvement in the diet and nutritional status of children in the State and the nation at large, knowing the out-come of malnutrition as it affects survival and health, education, productivity and the economy of the nation.

OH13

Food Consumption Patterns of Secondary School Adolescents aged 10 –18years in Enugu Urban Area of Enugu State, Nigeria

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Key words: Dietary patterns, food habits, adolescents

BACKGROUND AND OBJECTIVE
The rapid changes in physical growth and psychological development place adolescents as a nutritionally vulnerable group. Adolescents' food habits are important determinants of both present and future health (1), as well as, food behaviours in adulthood (2).The study assessed the dietary patterns of adolescents in secondary schools in Enugu-urban area of Enugu State, Nigeria.

MATERIALS AND METHODS
A cross-sectional survey was adopted for the study using multistage random sampling techniques to draw a total sample of 418 adolescents.A validated food frequency questionnaire was used to collect data on the respondents' food habits. A 24-hour dietary recall was used to elicit the food intake patterns. Descriptive statistics were carried out on the data collected, and presented in frequencies and percentages.

RESULTS AND DISCUSSION
Majority (82.5%) of the respondents ate three meals per day, while 2.5% ate once a day. More than half (55.6%) of the respondents skipped meals, and snacking was high (85.0%) with pastries (62.6%) as the major snack consumed while fruits and vegetables were scarcely (15.5%) consumed as shown in Table 1.Data collected from the 24-hour dietary recall of the respondents as presented in Table 2 showed that confectionaries and sweetened drinks were consumed by higher percentage (35.8%) of the respondents; 26.8% consumed cereals, while legumes and animal foods were less frequently consumed by 1.2% of the respondents.

CONCLUSION AND RECOMMENDATION
Poor dietary habits and patterns were noticed among the adolescents. The findings of this study underscore the need to encourage healthy eating patterns, especially consumption of vegetables and fruits among adolescents to ensure adequate micronutrient intakes and reduced chances of being overweight and obese.

Table 1: The dietary habit of the respondents.

Dietary habit	Frequency	Percent
Meal frequency		
One meal per day	10	2.5
Two meal per day	52	13.0
Three meal per day	331	82.5
>3 meals per day	8	2.0
Total	**401**	**100.0**
Meal skipping		
Yes	223	55.6
No	179	44.4
Total	**401**	**100.0**
Snacking		
Yes	341	85.0
No	60	14.9
Total	**401**	**100.0**
Types of snacks eaten		
Pastries	251	67.1
Soft drinks	34	9.1
Nuts and seeds	26	6.9
Fruits and vegetables	62	16.6
Others	1	0.3
Total	**374**	**100 .0**

Table 2: Frequency of consumption of food from food groups

Food groups	Frequency	Percent
Legumes	5	1.2
Milk and dairy products	49	12.2
Cereals	107	26.7
Confectionaries and sweetened drinks	144	35.9
Fruits and vegetables	73	18.2
Fat and oil	18	4.5
Meat and fish	5	1.2
Total	**401**	**100.0**

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OH15

The Evaluation of the Protein Quality of a Composite Meal from Rice, Cowpea and Sunflower

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Keywords: weaning foods, weaning, fermented, germinated, protein

BACKGROUND AND OBJECTIVES

The increase in malnutrition in children in the north east, Borno State in particular due to the increase in number of internally displaced people and the harsh economy calls for the development of composite meals from locally available resources. The aim of the study is to develop a cereal-legume composite meal from locally available resources to tackle the problem of malnutrition in children.

MATERIALS AND METHODS

Weaning foods were formulated in a cereal-legume combination using rice (Tinno and Zabarmari), cowpea (Borno Red) and sunflower seed. The rice (Tinno and Zabarmari). The rice was fermented, the cowpea was germinated while the sunflower seed was roasted. Two weaning foods were formulated as follows: Tinno rice (60%)-cowpea (30%)- sunflower (10%) TRCS; Zabarmari rice (60%)-cowpea (30%)-sunflower (10%) ZRCS. Protein Efficiency Ratio (PER) was determined by the method of Chapman *et al*. (1959). Nitrogen balance was determined by the method of Chick and Roscoe, (1930) was evaluated by animal feeding experiment using 24 weanling albino rats of 21-24 days with an average weight of 32.6g. Commercial weaning food Cerelac® was used as commercial control. Data obtained were subjected to Analysis of Variance (ANOVA). Duncan's multiple range test was used to separate the means. Significance was accepted at $p \leq 0.05$.

RESULTS AND DISCUSSION

The Protein Efficiency Ratio of ZRCS is 2.20, TRCS (2.34) and Cerelac® (2.87). PER of a food reflects its BV because the weight gain measured are depended on the incorporation of food protein into tissue protein. PER for plant protein is 1.2-2.4. PER values are corrected to an assumed value of 2.5 for casein control of 2.5.The Biological Value of ZRCS (76.00%) and TRCS (72.55%) were comparable to that of Cerelac® (80.00%). The BV of a protein is a measure of how efficiently the absorbed food protein is converted into body tissue protein. If a food contains adequate amount of all the 9 essential amino acids, the amino acids in the food protein are efficiently incorporated into the body protein. To determine BV, nitrogen retention in the body is compared with the nitrogen content of the food protein. The better the match the higher the BV.

Table 1: Protein Eficiency Ratio (PER) of Composite Weaning Foods

Parameters	ZRCS	TRCS	Cerelac®
Protein intake (g)	2.58[a]	2.41[a]	4.63[b]
Food intake (g)	25.45[a]	23.35[b]	30.85[c]
Weight gain (g)	5.68[a]	5.65[a]	13.28[b]
P.E.R	2.20[a]	2.34[a]	2.87[a]

Values are recorded as mean± SD. Means in the same row with different superscripts are significantly different (P≤0.05).

Table 2: Biological Value of Composite Meals

Parameters	ZRCS	TRCS	Cerelac®
Nitrogen intake (g)	0.71[a]	0.66[b]	0.88[c]
Urinary Nitrogen (g)	0.26[a]	0.28[b]	0.23[a]
Fecal Nitrogen (g)	1.07[a]	1.01[a]	1.29[a]
MFN (g)	0.83[a]	0.82[a]	0.86[a]
EUN (g)	0.14[a]	0.16[a]	0.15[a]
Retained Nitrogen (g)	0.38[a]	0.37[a]	0.46[a]
Absorbed Nitrogen (g)	0.50[a]	0.51[a]	0.55[b]
TPD (%)	70.42[a]	70.97[a]	71.14b
	[a]	72.55[b]	80.00[c]

Values are recorded as mean± SD. Means in the same row with different superscripts are significantly different (P≤0.05).

CONCLUSION AND RECOMMENDATION

The two complementary weaning foods exhibited high PER and BV this therefore indicate that they can promote growth and can be recommended for children of weaning age.

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PH16

Food Consumption Pattern and Anthropometric Measure of Orphanage Children in Eastern and Western District of Kogi State.

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Keywords: feeding pattern, malnutrition, diversity, nutritional status.

BACKGROUND/OBJECTIVE OF STUDY:
Healthy eating during early childhood is important for growth and development This study was undertaken to study to assess feeding pattern and nutritional status of orphanage children in eastern and western district of Kogi State.

MATERIAL AND METHOD:
A descriptive research design was used for the study and random sampling was used to select 120 children for the study. The instrument used for data collections were questionnaires, Harison's bathroom scale, non-stretch measuring tape. Data was presented using mean, frequency and percentages and analyzed using statistical product for service solution version 21.

RESULT:
From the result, children both male and female had BMI at 15.04kg/m2 and 15.05kg/m2 respectively. Few (8.3%) of the children were stunted, 16.7% wasted while 11.7% were severely underweight. Result from MUAC showed that at cut off level of ≤12cm, 27.5% were severely malnourished, 55% of the children were moderately malnourished while 30.8% were normal. Result from food consumption pattern indicates that 85% of the orphanage children ate three times a day. Daily consumed locally processed carbohydrate foods were cassava flour pudding, rice, garri, millet, maize and yam. There was poor consumption of protein food sources. Paw-paw(9%),oranges(8%),tomatoes(13%),bitter leaf(21%),mangoes(9%) and okra(18%) were consumed 2-4times per week.

CONCLUSION:
High reliance on staple food sources, low intake of adequate nutrient and monotonous diet resulted to high rate of malnutrition. it is recommended that adequate training of orphanage personnel on the nutritional needs of children should be considered during food preparation and distributions.
Keywords: MUCA, malnutrition, personnel, consumption.

PH17

Amino Acids Profile of Germinated Brown Finger Millet Complemented with Bambara Nut Protein Concentrate and Carrot Flour

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Keywords: Amino acids profile, brown finger millet, bambara-nut protein concentrate

BACKGROUND AND OBJECTIVES:

Complementary foods are foods other than breast milk or infant formula introduced to an infant to provide nutrients (1). Germination has been demonstrated to be effective method that can be utilized to enhance the nutritional quality of flours, modify textural characteristics, predigest high molecular weight macromolecules and reduce antinutrients contents. Therefore, the study examined the amino acids profile of germinated brown finger millet complemented with bambara-nut protein concentrate and carrot flour.

MATERIALS AND METHOD:

Brown finger millet, bambara-nut and carrot roots were purchased from Kure Ultra-market in Minna, Niger State. The brown finger millet were sorted, washed and then soaked in distilled water for 12hrs, at ambient temperature. The water was changed every 4hrs to avert fermentation. The soaked brown finger millet were distributed on jute bags and allowed to germinate for 24hrs while water was sprinkled on it every 3hrs. After germination, it was oven dried for 12hrs, then dry milled. Modified method by (2) was used in the production of bambara-nut protein concentrate. The samples were blended in ratio 60% germinated brown finger millet flour, 10% of bambara nut protein concentrate, 30% carrot flour. 65% germinated brown finger millet flour, 10% bambara nut protein concentrate, 25% carrot flour. 70% germinated brown finger millet, 10% bambara nut protein concentrate, 20% carrot flour. A, B, C, respectively while D serves as control (Commercial product). Samples were then analysed using the HPLC machine buck logical BLC10/11-model furnished with UV 338nm indicator to determine amino acids profile. All evaluation tests were conducted in triplicates. The analyses were conducted in triplicates. Data obtained were subjected to one-way analysis of variance and differences among the means were determined using Duncan multiple range test. Statistical Package for the Social Sciences (SPSS) version 23.0 was used to analyse the data and $p<0.05$ was considered to be statistically significant.

RESULTS AND DISCUSSION:

From the results obtained in table 1, it was established that there was significant different ($p<0.05$) across the blends. Sample A (60% germinated brown finger millet flour, 10% of bambara-nut protein concentrate, 30% carrot flour) had the highest value of amino acids profile of 31.07mg/100g, followed by sample (B and C) 29.43mg/100g, 20.82mg/100g respectively, with control having the least value of 12.59mg/100g. Conversely, amino acids profile increase with decrease in percentage of germinated brown finger millet inclusion and increase in percentage of carrot flour.

CONCLUSION:

Sample A was the best based on the values obtained from the amino acids profile of the formulated blends.

Table 1: Amino acids profile of the formulated blends and control (commercial product)

Amino acids	A	B	C	Control
Tryptophan	$2.13^{a}\pm0.014$	$1.98^{b}\pm0.007$	$0.85^{c}\pm0.007$	$0.46^{d}\pm0.021$
Histidine	$1.84^{a}\pm0.014$	$1.66^{b}\pm0.007$	$1.75^{c}\pm0.014$	$0.45^{d}\pm0.000$
Leucine	$2.40^{a}\pm0.007$	$2.12^{b}\pm0.007$	$1.89^{c}\pm0.007$	$1.15^{d}\pm0.014$
Isoleucine	$2.29^{c}\pm0.021$	$2.12^{c}\pm0.007$	$2.08^{c}\pm0.007$	$0.56^{d}\pm0.368$
Phenylalanine	$1.59^{a}\pm0.014$	$1.32^{b}\pm0.007$	$1.27^{c}\pm0.014$	$0.81^{d}\pm0.014$
Valine	$1.17^{b}\pm0.007$	$1.02^{c}\pm0.014$	$0.97^{d}\pm0.007$	$0.95^{d}\pm0.014$
Lysine	$1.97^{a}\pm0.021$	$1.77^{b}\pm0.014$	$1.89^{c}\pm0.021$	$0.87^{d}\pm0.000$
Methionine	$3.37^{a}\pm0.007$	$3.29^{b}\pm0.000$	$0.97^{c}\pm0.014$	$0.41^{d}\pm0.007$
Threonine	$1.63^{a}\pm0.007$	$1.69^{b}\pm0.014$	$0.37^{c}\pm0.007$	$0.37^{c}\pm0.007$
Asparagine	$1.95^{a}\pm0.014$	$1.86^{b}\pm0.007$	$0.49^{c}\pm0.007$	$0.20^{d}\pm0.014$
Arginine	$0.78^{a}\pm0.014$	$0.83^{b}\pm0.014$	$0.68^{c}\pm0.007$	$0.41^{d}\pm0.007$
Alanine	$0.89^{a}\pm0.007$	$1.04^{b}\pm0.007$	$1.00^{c}\pm0.014$	$0.79^{d}\pm0.007$
Aspartate	$1.26^{a}\pm0.014$	$1.15^{b}\pm0.014$	$0.73^{c}\pm0.014$	$1.32^{d}\pm0.014$
Glutamate	$2.35^{c}\pm0.007$	$2.18^{c}\pm0.014$	$1.43^{d}\pm0.014$	$1.30^{d}\pm0.205$
Glycine	$0.68^{b}\pm0.007$	$0.54^{c}\pm0.014$	$0.55^{c}\pm0.014$	$0.40^{d}\pm0.021$
Tyrosine	$1.27^{b}\pm0.014$	$1.34^{c}\pm0.000$	$0.62^{d}\pm0.014$	$0.64^{d}\pm0.014$
Cysteine	$0.86^{a}\pm0.014$	$0.90^{b}\pm0.014$	$1.18^{c}\pm0.007$	$0.30^{d}\pm0.014$
Proline	$0.87^{a}\pm0.014$	$0.95^{b}\pm0.000$	$1.25^{c}\pm0.007$	$0.24^{d}\pm0.007$
Serine	$1.77^{a}\pm0.007$	$1.67^{b}\pm0.007$	$0.85^{c}\pm0.007$	$0.96^{d}\pm0.007$

Means on the same column with different superscript letter are significantly different ($p<0.05$) while those with the same superscript letter are not significantly different ($p>0.05$).

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PH18

Amino Acids Profile of Germinated Brown Finger Millet Complemented with Bambara Nut Protein Concentrate and Carrot Flour

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Keywords: Infant and Young Child Feeding (IYCF) Practices, Minimum Meal Frequency (MMF), Minimum Dietary Diversity (MMD), Minimum Acceptable Diet (MAD).

BACKGROUND AND OBJECTIVES:

The United Nations Children's Fund (UNICEF) has described malnutrition as a triple burden. The three strands of malnutrition identified are undernutrition, hidden hunger and overweight. Even though the three are interlocked, under-nutrition stands out as the foremost [1]. As a result of the impact of infant and young child feeding practices on children in the first 1000 days of life, which tracks into the later years and up till adulthood, the World Health Organisation (WHO) developed eight core indicators for assessing IYCF practices [2]. The MMF, MDD and the MAD are three out of the eight core indicators that focus on complementary feeding practices during the complementary feeding period of a child's life. The seven foods groups used for these indicators are (i) grains, roots and tubers (ii) legumes and nuts (iii) dairy products (milk, yogurt, cheese (iv) flesh foods (meat, fish, poultry and liver/organ meats(v) eggs(vi) vitamin-A rich fruits and vegetables(vii) other fruits and vegetables. According to UNICEF, more children are surviving but not attaining their full physical and mental potential as a result of under-nutrition [1]. This study set out to assess the IYCF practices in a study population in Gombe state.

MATERIALS AND METHODS:

Ethical approval was obtained from the Gombe State Ministry of Health. The study was conducted at nutrition clinics of selected primary health centres in the Gombe LGA with ninety-one (91) mother-child pair who gave their verbal informed consent. Data was gathered from a 24-hour dietary recall questionnaire which was enumerator-administered to elicit information on the child's food over the previous 24 hours. This was used to assess Minimum Meal Frequency (MMF), Minimum Dietary Diversity (MMD) and Minimum Acceptable Diet (MAD). The data was then coded and analysed using SPSS version 20 and the results presented in frequency and percentages.

RESULTS:

Results on attainment of MDD, MMF and MAD as shown in Table 1 reveals that 92.3% of the children attained the MMF while only 37.4% attained MDD and 38.5%, MAD. Minimum Meal Frequency attainment rate was very high, pointing to a very good energy intake from foods other than breast milk of the diets consumed by the children [3]. In most resource-limited settings in northern Nigeria, children are fed mainly with cereal grains, legumes, tubers and leafy vegetables. Flesh foods, dairy products and eggs are more of seasonal than daily supplies probably due to meagre resources and probably family size.

Table 1: Attainment of MDD, MMF and MAD by Children in the Study.

S/N	Complementary Feeding Indicator	Frequency (n)	Percentage (%)
1.	Minimum Dietary Diversity (MDD)		
	=>4 Food groups	34	37.4
	<4 Food groups	57	62.6
	Total	91	100.0
2.	Minimum Meal Frequency (MMF)		
	=>3 Feedings	84	92.3
	<3 Feedings	7	7.7
	Total	91	100.0
3.	Minimum Acceptable Diet (MAD)		
	MDD+MMF	35	38.5
	With only MDD or MMF or none	56	61.5
	Total	91	100.0

CONCLUSION AND RECOMMENDATION:

The study follows the current trends where children seem to be satisfying their energy needs, but not their nutritional needs. There is a need to direct efforts towards harnessing the existing food systems to maximally achieve consumption minimums.

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PH19

Assessment of Nutritional Knowledge and Feeding Behaviour of Children in Some Selected Day Care Centres in Sabon-Gari L.G.A Kaduna State, Nigeria.

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Keywords: Nutrition education, feeding behaviour, and Day Care Centres

BACKGROUND:
Adequate nutrition is useful not only for the survival of the child but also for maximum physical, mental and social development. Thus, Day Care Centres have a responsibility to promote and practice a balanced nutrition education which constitutes knowledge in Child nutrition and feeding behaviour and forms an integral part of childhood development to Adulthood. The parent and the caregiver in daycare centres play an important role in this regard. The objectives of the study were to assess the knowledge of child nutrition and feeding behaviour of Caregivers in Day Care Centres and the readiness of Caregivers in providing balanced nutrition education in some selected Day Care Centres in Sabo-Gari Local Government of Kaduna State.

METHODS:
The study was carried out in Sabo-Gari Local Area of Kaduna State**.** Multistage sampling technique was used to select the day care Centres (n=80) and the respondents (n=40), and a structured questionnaire was used to collect the information on socio-economic and demographic characteristics, and nutritional knowledge of the respondents. Data collected was analyzed using descriptive statistics of frequency and percentages.

RESULTS:
Indicated that majority which represented 65% of the respondents have the requisite knowledge regarding Children nutrition. About 20.5% of the respondents were conversant with the different feeding behaviours attributed to children. A total of 25% of the respondents had adequate knowledge of both child nutrition and feeding behaviour necessary for a balanced nutritional education in early childhood.

CONCLUSION:
There is a need to promote nutrition education among daycare Centre operators and to have the knowledge of developmentally appropriate feeding behaviour of young children as this will help prevent feeding disorders and behaviour problems.

OH20

Assessment of Dietary Pattern and Nutritional Status of Women of Childbearing Age in Kano Municipal Local Government Area, Kano State, Nigeria

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Keywords: Dietary pattern, nutritional status, reproductive age, dietary recall, anthropometry

BACKGROUND AND OBJECTIVES:
The nutritional status of women of reproductive age is very crucial to the wellbeing of the children and the society at large. Maternal mortality in Nigeria accounts for an estimated 14% of global maternal deaths [1]. Good dietary pattern among pregnant women reduces the rate of maternal and infant mortality which is still a big problem in developing countries like Nigeria. The main objective of this study is to assess the nutritional status and dietary pattern of women of reproductive age in a specific community in Kano State.

MATERIALS AND METHODS:
A total of 250 women of reproductive age residing in Kano Municipal LGA, Kano State were recruited into the study by simple random sampling method. Modified structured interviewer administered questionnaires were used to elicit data on socio-demographic characteristics, anthropometric indices, biochemical analyses, while a 7-day dietary recall was used to assess the dietary pattern and nutritional status of the respondents.

RESULTS AND DISCUSSION:
Dietary pattern of women of reproductive age in Kano Municipal L.G.A
About 78% of the women consumed carbohydrate rich diets on daily basis, along with fat rich diet. Only 30% of the women were reported to have consumed protein rich diet on daily basis while 12.8% consumed protein occasionally which is very significant.

The high intake of food items from carbohydrate rich food in this study confirmed that diets of women of reproductive age in Kano Municipal LGA are predominantly based on starchy staples, together with fats used in cooking and other vegetables such as tomatoes, onion, and pepper were consumed along with the main meal as in soups to serve as complements. Intake of fruits such as vitamin A rich and other fruits e.g. banana, pineapple, watermelon, and protein rich foods such as beef, milk, eggs and fish were observed to be low. This finding agrees with a study conducted in Nigeria by Ibrahim [2] which reported high consumption of cereals and other vegetables. Likewise in Tanzania, Zerida [3] reported high consumption of cereals, dark green leafy vegetables, vitamin A rich vegetables, other vegetables, legumes, oils and fats. The least consumed foods included eggs, fish, flesh meat, organ meat, milk and milk products, other fruits and vitamin A rich fruits.

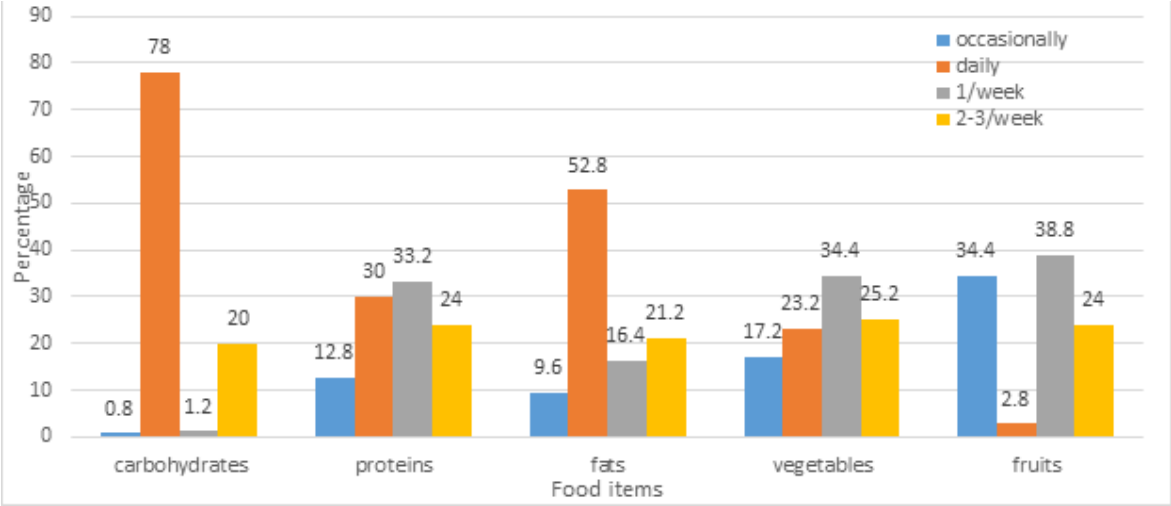

Figure 1: Dietary Pattern of Women of Reproductive Age in Kano Municipal LGA

Nutritional status of women of reproductive age in Kano Municipal LGA

Anthropometric indices such as Body Mass Index (BMI) and waist-to-hip ratio (WHR) was used to assess the nutritional status of the women. BMI results revealed that 34% of the women were underweight, 30.8% were within the normal range, 24% were overweight, while 11.2% were obese. For the waist-to-hip ratio (WHR), 68% were at risk of developing chronic diseases, while 32% were within the normal range.

CONCLUSION AND RECOMMENDATION(S):

The findings of the research indicated that the dietary pattern of women of reproductive age in the studied area has more of carbohydrate based diet compared to protein diet which is most important especially during their reproductive years and that they have slightly poor nutritional status confirmed by anthropometry, these might be due to low socio-economic status, illiteracy and lack of nutrition education among others.

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OH21

Iron Deficiency Anaemia among Pregnant Women Attending Antenatal Care Unit, Aminu Kano Teaching Hospital, Kano

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KEYWORDS: Iron-indices; Pregnancy; Antenatal

BACKGROUND AND OBJECTIVES

Iron is extremely important during pregnancy owing to rapid cell and tissue development associated with foetal growth [1]. Inadequate amount of iron during pregnancy could lead to iron deficiency anaemia (IDA) which may cause negative perinatal outcomes such as premature labour, intrauterine growth restriction, low birth weight, postpartum depression and developmental delays in baby's growth [2]. Hence, this study investigated the prevalence of iron deficiency anaemia among pregnant women attending antenatal care unit, Aminu Kano Teaching Hospital (AKTH), Kano.

MATERIALS AND METHODS

The study was longitudinally designed to evaluate the prevalence of IDA among pregnant women attending antenatal care unit AKTH, Kano. A total of 112 pregnant women within the age of 15-49 years in their second trimester at the time of study were recruited however, only 85 women were followed up to third trimester. Blood samples were collected from consented pregnant women during the second trimester and 12 weeks post recruitment for the determination of serum iron, total iron binding capacity, transferrin saturation and serum ferritin levels.

RESULTS AND DISCUSSION

The result showed that the prevalence of iron deficiency (based on serum iron level) and IDA (based on transferrin saturation and serum ferritin levels) among the pregnant women during the second trimester were 8.0%, 10.7% and 14.0% respectively, which subsequently increased to 12.9%, 30.6% and 21.2% respectively during the third trimester as indicated in Table 1. The prevalence of IDA was reported for the first time among pregnant women in Kano State and could be linked to mother's low iron stores at the time of conception as well as the quantity of iron absorbed as the gestation progresses (Osungbade and Oladunjoye, 2012). It might also be infections such as malaria and hookworm infestation that is responsible for the iron deficiency [4].

Table 1: Prevalence of Iron Deficiency and Iron Deficiency Anaemia among Pregnant Women Attending Antenatal Care Unit, AKTH, Kano

Prevalence	Second Trimester (% [n=112])	Third Trimester (% [n=85])
Iron Deficiency	8.0	12.9
Iron Deficiency Anaemia	10.7	30.6
	14.0*	21.2*

Values with asterisk (*) are prevalence based on serum ferritin. Indices used as criteria: Iron deficiency based on serum iron <8.0 and <5.0 μmol/L [5] for second and third trimester respectively; Iron deficiency anaemia based on transferrin saturation <14.0 and <9.0% [5] for second and third trimester respectively and serum ferritin <12 ng/ml [5].

CONCLUSION AND RECOMMENDATION

In conclusion, progression from second to third trimesters is associated with increased risk for iron deficiency and IDA among the pregnant women. It is recommended that pregnant women should be continuously encouraged on the need to take iron/folate supplement and iron-rich foods without undermining good feeding practices in order to combat iron deficiency and IDA.

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OH22

Formulation and Quality Evaluation of a Complementary Food Blend from Fermented Yellow Maize, Soybean and Fishmeal

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KEY: Complementary, Food blend, Infant, Nutrition

BACKGROUND AND OBJECTIVES:
With the recent security challenges affecting people in the North East region of Nigeria, food security is at stake which increases the predisposition to infant malnutrition that is often associated with poverty and ignorance. Protein-energy malnutrition generally occur during the phase when children transit from liquid to semisolid or fully adult food. Therefore, there is need to supplement the diet of this group of children with energy and nutrient dense foods.

MATERIALS AND METHODS:
A complementary food blend was prepared as recommended by WHO/FAO and Codex for improved protein and nutrient quality in a 60:20:20 ratio from fermented yellow maize, roasted soybean and fishmeal respectively. Standard methods (AOAC) were used to evaluate nutritional values of raw and processed materials and the formulated complementary food blend.

RESULTS AND DISCUSSION:
Water absorption capacity of the fermented yellow maize significantly decreased ($P< 0.05$) with decreases in pH and increase in titratable acidity from 20% - 51% (0 – 72h). The carbohydrate (64.35±0.03%), protein contents (14.55±0.03% and energy value (351.64±0.03 Kcal/100g) of the complementary food blend was closely comparable to the commercial weaning food cerelac® (Carbohydrate 69.00%, Protein 15.0% and energy 426.00Kcal/100g) and satisfied the needs of infants. The low moisture (3.1±0.02%) and fat (4.02 ± 0.02%) contents exhibited by the complementary food blend might give a good storage stability. The iron level of the complementary food (40.33± 0.03%) was higher than that of the commercial weaning food celerac® (10.0%), though the level of potassium, zinc and calcium were lower compared to the commercial food. Minerals from plant sources have very low bioavailability because they are complexed with non-digestible materials and anti-nutrients. Fermentation and other processing methods reduce the anti-nutrients and improve the bioavailability of iron and other mineral elements that would have been unavailable before processing, this is in line with earlier reports [1] and these processes improve shelf life, palatability and overall enhance protein quality by decreasing carbohydrate and increasing the availability of amino acids [2][3].

CONCLUSION AND RECOMMENDATION:
The formulated complementary food blend from fermented yellow maize supplemented with soybean and fishmeal may be a cheap and good alternative source of energy and nutrients for infants in the transition

phase. Women in the North East should thus be educated and encouraged on ways to prepare nutrient-rich complementary meal for transiting infants using available resources in the locality.

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OH23

The Relationship Between Dietary Pattern and Severity of Pain Crisis In Adolescents With Sickle Cell Anaemia Attending Barrau Dikko Teaching Hospital (BDTH), Kaduna

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Key words: Dietary pattern, Adolescents, Pain severity, Sickle cell anaemia

BACKGROUND AND OBJECTIVE:

Sickle cell anaemia (SCA) is an inherited chronic disease whose clinical manifestations arise from the tendency of the haemoglobin to polymerize and deform red blood cells into a sickled shape [1]. SCA affects 20–25 million people globally and it is estimated that 240,000 children are born with SCD annually in sub-Saharan Africa [2]. The World Health Organization (WHO) reported that Nigeria has the highest number of SCA sufferers worldwide [3].Children and adolescents with SCA have high risk of nutritional deficiencies and delayed growth mostly due to inadequate dietary intake caused by increased nutritional need due to the disease [4]. A better nutrition could improve body composition, especially lean mass, and have a positive impact on SCA morbidity and mortality [5].Therefore, this present study was aimed at investigating the dietary pattern and severity of pain crisis amongst adolescents living with SCA in order to establish possible relationship between these parameters.

MATERIALS AND METHODS:

In this non-interventional cross-sectional study carried out for three months, fifty consenting adolescents aged 10 to 19years in steady state attending the Sickle Cell Clinics (Paediatrics and Adult) of BDTH Kaduna, for their routine follow-up visits were selected using simple random sampling method from approximately 2,500 individuals registered in both clinics. Sample size was derived from the formula by James *et al.*, 2001. Severity of pain crisis was evaluated using a modified Wong-Baker's Scale and a pain diary. Food consumption pattern was determined using food frequency questionnaires.Data analysis was carried out using Statistical Package for Social Sciences (SPSS) software version 20. Chi-square analysis was used to determine the relationship between dietary intake and severity of pain.

RESULTS AND DISCUSSION:

Mean age of the adolescents was 14.3±2.8years. Adolescents who had no pain crisis throughout the study were 28% while 42%, 18% and 12% had mild, moderate and severe pain respectively. Dietary pattern of the adolescents consisted mostly of cereals (36%), roots and tubers (28%), milk and milk products (24%) of which were consumed 5-6 times a week with vegetables being the least consumed. Roots and tubers, milk and milk products significantly reduced pain severity ($p<0.05$) while meal skipping significantly increased pain ($p<0.05$).

CONCLUSION AND RECOMMENDATION:

Poor dietary practices contributed significantly to the severity of pain crisis of the adolescents living with SCA. Adequate consumption of roots and tubers, milk and milk products vegetables and fruits alongside other food groups should be encouraged among adolescents with SCA as they contain series of macronutrient and micronutrients whose deficiency has been shown to be associated with an increase in the severity of the disease.

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OH24

Prevalence of the Double Burden of Malnutrition among Undergraduates in Selected Tertiary Institution in Ibadan, Oyo State

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Keywords: Double burden, underweight, obesity, undergraduates

BACKGROUND AND OBJECTIVES:
Most developing countries are facing diverse nutritional challenges. The double burden of malnutrition also known as the dual burden of undernutrition could be defined as the co-existence of undernutrition and overnutrition occurring concurrently within a population (1). Undernutrition and obesity are listed among the top ten most important risk factor for the global burden of disease (2). In Nigeria, there is paucity of information on the prevalence of double burden of malnutrition among adolescents and young adults. This study was aimed at assessing the prevalence of underweight, overweight and obesity among undergraduates in Ibadan, Oyo State.

MATERIALS AND METHOD:
This study involved 380 participants (including 180 male and 200 female (non-pregnant) undergraduates of Federal College of Agriculture, Ibadan. Verbal informed consent was obtained from the participants. Anthropometric measurements were obtained using bathroom weighing scale to measure the respondents' weight in kilogram while stadiometer was used in measuring the height in meters. Body Mass Index (BMI) was calculated [BMI = weight (kg) / height^2 (m^2)] and was categorized as underweight (BMI less than18.5kg/m^2), normal weight (BMI = 18.5 to 24.99), overweight (BMI = 25 to 29.99), obesity type I (BMI = 30 to 34.99), obesity type II (BMI = 35 to 39.99) and morbid obesity (BMI greater than 40kg/m^2). Statistical analysis was carried out using Statistical Package for Social Science (SPSS) version 20. For descriptive statistics, mean and standard deviations were used to summarize the age and anthropometric indices while chi-square test were done to investigate association between BMI and gender where P-value < 0.05 was considered to be statistically significant.

RESULTS AND DISCUSSION
The results revealed the mean age, height, weight and BMI of 23±0.07years, 1.64±0.003m, 63.5±0.39kg and 23.80±0.14kgm^2 respectively. About 14.5% were underweight, 56.6% had normal weight, 21.8% were overweight while 4.7% were obese. Higher prevalence of underweight, overweight and obesity was observed among female students while a statistical significant difference was observed between the body mass index category of the male and female students ($p = 0.004$).

Table 1: Mean age, height, weight of respondents

Gender	Years	Height	Weight	Body mass index (BMI)
Male (n=180) Mean	22.5±0.081	1.67±0.003	63.2±0.412	23.79±0.153
Female (n=200) Mean	23.60±0.078	1.60±0.004	64.5±0.372	23.95±0.136
Total (n=380) Mean	23.80±0.074	1.64±0.035	63.5±0.394	23.8±0.412

Table 2: BMI categories of respondents

BMI categories	Male (%)	Female (%)	Total %	P
Underweight	26(14.5)	29(14.5)	55(14.5)	
Normal weight	103 (57.2)	112(56.0)	215(56.6)	0.004
Overweight	40 (22.2)	43(21.5)	83(21.8)	
Overweight type1	6(3.3)	10(5.0)	18(4.7)	
Overweight type2	3(1.7)	4(2.0)	7(1.8)	
Morbid obesity	2(1.1)	2(1.0)	4(1.1)	

CONCLUSION AND RECOMMENDATİON:

The coexistence of undernutrition and overnutrition was observed among respondents in this study. There is therefore the need for urgent interventation through nutrition education and promotion of healthy lifestyles among this age category to reduce the prevalence of double burden of malnutrition.

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OH25

Prevalence and Severity of Anaemia among Pregnant Women at First Antenatal Care Visit, Aminu Kano Teaching Hospital, Kano

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Keywords: Anaemia; Pregnant-women; Antenatal

BACKGROUND AND OBJECTIVES

Anaemia is a public health issue and is defined as blood haemoglobin concentration of less than 11 g/dl during pregnancy. Anaemia causes adverse effects to the mother and foetus as well as contributing significantly to high maternal mortality [1]. In Nigeria, 61.0% prevalence of anaemia among pregnant women was reported [2]. The study was therefore aimed at assessing the prevalence and severity of anaemia among pregnant women at their first visit of antenatal care, Aminu Kano Teaching Hospital (AKTH), Kano.

MATERIALS AND METHODS

A cross-sectional study was designed to assess the prevalence and severity of anaemia among pregnant women at AKTH Kano. One hundred and twelve (112) apparently healthy pregnant women (15-49 years) were randomly selected and recruited into the study. Demographic/obstetrics data were assessed using validated semi-structured questionnaire. Blood samples were collected by a trained phlebotomist using standard procedures of venepuncture and utilized for determination of haemoglobin.

RESULTS AND DISCUSSION

The result showed that the mean age and gestational age were 29 years and 20 weeks respectively, while the prevalence of anaemia (based on haemoglobin levels) among the pregnant women was 37.5% as presented in Table 1. Demographic/obstetric factors such as multiple pregnancies have been reported to have significant effect on condition and outcomes of pregnancy as well as risk factor for anaemia [3]. Based on the WHO classification of severity of anaemia in pregnancy, 16.0, 17.9 and 3.6% of the pregnant women were mildly, moderately and severely anaemic respectively (Figure 1). The severity of anaemia worsens as pregnancy progresses and there exists dramatic change in haemoglobin levels during pregnancy in response to the increasing maternal blood volume and the iron requirements of the foetus.

Table 1: Demographic/Obstetrics Data and Prevalence of Anaemia among Pregnant Women at AKTH, Kano

Demographic/Obstetrics Data	Frequency (n = 112)
Age (years)	28.88 ± 5.66*
Number of Children	2.29 ± 1.93*
Gestational Age (weeks)	19.96 ± 3.28*
Gravidity	
Primigravida	19
Multigravida	93
Prevalence of Anaemia	37.5%

Values with asterisk (*) are presented as Mean ± Standard deviation.

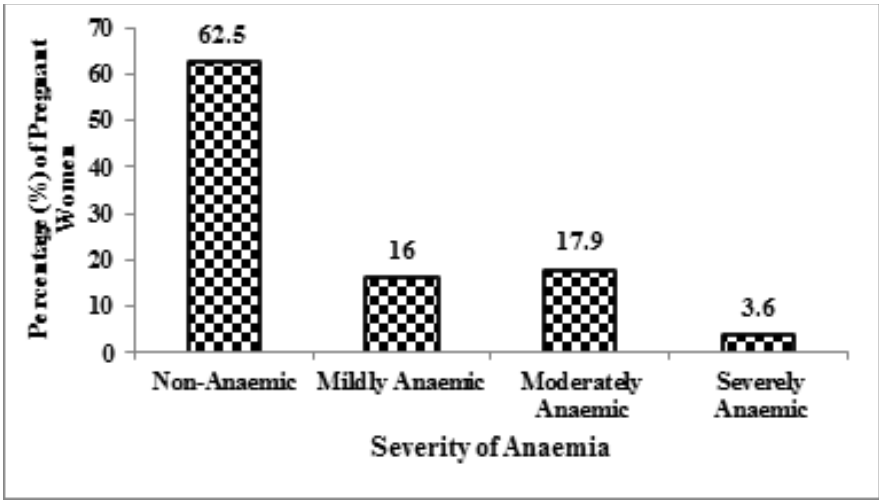

Figure 1: Severity of Anaemia among Pregnant Women at AKTH, Kano

CONCLUSION AND RECOMMENDATION

Conclusively, the prevalence of anaemia estimated among the pregnant women was of public health significance. It is recommended that current interventions for anaemia should be reassessed; sustainable and cost effective strategies that will help reduce the extent of anaemia among pregnant women should be developed.

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OI1

Enhancing The Proximate Composition And Beta-Carotene Contents Of Snacks (Chin–Chin And Doughnut) Through Incorporation Of Orange-Fleshed Sweet Potato

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Key Words: Enhancement, Proximate, Beta-carotene, Snacks

BACKGROUND AND OBJECTIVES

Orange-fleshed sweet potato (OFSP) varieties contain high levels of ß-carotene used to combat Vitamin A deficiency (1) in under-five children and breast feeding mothers. Until recently, relatively little emphasis was placed on OFSP varieties by researchers since farmers in Nigeria were not used to the orange colour in sweet potatoes. The scenario, however, changed after farmers realized that the OFSP varieties have higher food value in the form of ß-carotene than the white or yellow types. Chin- chin is among the most popular food products (snacks) all over the world whereas doughnut is a popular snack in many countries. On account of its high carotenoid content, the use of OFSP in products such as chin-chin and doughnut can change the perception of people towards sweet potato (2). The high perish-ability (high water activity, a_w) of OFSP after harvest limits its diversification, hence, its processing into flour and incorporation as a component of composite flour with wheat flour to produce snack would greatly encourage its consumption. This would ultimately improve the intake of ß-carotene.

MATERIALS AND METHODS

OFSP were processed into flours and used to prepare composite flours with wheat flour (standard) to obtain the two different composites each for chin-chin and doughnut. The proportions used were- 1:1 and 2:1 while 100% wheat flour was the control. Two experimental snacks, each for chin-chin and doughnut were produced, and a control sample for each snack. These were: CC_A (1:1), CC_B (2:1) [chn-chin]; DN_A(1:1), DN_B (2:1), [doughnut].The control samples were CC_S and DN_S. Proximate analysis and ß-carotene determination were done (in triplicates) on the samples. Sensory evaluation was carried out while the results were subjected to a one-way analysis of variance (ANOVA).

RESULTS AND DISCUSSION

Results showed that crude protein (CP) of doughnut increased very significantly ($p<0.05$).This is attributed to fermentation (3). Ash contents of chin-chin samples increased significantly ($p<0.05$) Crude fibre was higher in wheat samples than in OFSP ones; the former contains more crude fibre. The experimental samples had significantly lower calories.

ß-carotene results indicated that generally, chin-chin and doughnut produced with OFSP had significantly ($p<0.05$) higher contents while control samples (100% wheat) had insignificant quantities of ß-carotene. In sensory evaluation, the overall acceptability of all the snacks was not significantly ($p<0.05$) different from each other.

CONCLUSION AND RECOMMENDATION

Incorporating OFSP flour into wheat flour produced chin-chin and doughnut that enhanced their nutritive value, more especially ß-carotene. All the snack samples were also acceptable. It recommended that lower proportion of OFSP be tried out in producing the same snacks.

Proximate composition and Beta-carotene contents of chin-chin and doughnut from composite flours of wheat and orange-fleshed sweet potatoes.

Samples	Protein (g/100g)	Ash (g/100g)	Moisture (g/100g)	Crude fibre (g/100g)	Fat (g/100g)	CHO (g/100g)	Calories (kcal)	β Carotene
CS_S	5.14±0.15^{d}	1.03±0.15^{a}	3.11±0.6^{f}	1.66±0.23^{a}	17.52±0.33^{cd}	71.52±0.33^{cd}	471.07±2.02^{b}	0.57±0.12^{a}
CA_A	3.74±0.08^{e}	1.25±0.03^{ab}	4.59±0.33^{e}	1.39±0.21^{b}	13.47±0.11^{b}	75.55±0.44^{b}	443.98±1.49^{b}	7.49±0.40^{c}
CC_B	3.08 ± 0.04^{f}	1.46 ±0.06^{a}	7.23±0.21^{d}	0.97±0.03^{cd}	9.75±0.35^{c}	77.52±0.17^{a}	414.03±2.71^{c}	11.72±0.18^{a}
DN_S	9.97± 0.42^{a}	0.78 ±0.22^{a}	12.78±0.36^{c}	1.16±0.11^{bc}	4.45± 0.83^{d}	70.87±0.34^{d}	367.99±6.41^{d}	0.08±0.04^{f}
DN_A	9.17±0.04^{d}	0.92 ±0.07^{cd}	14.57±0.28^{b}	1.10. ±0.06^{c}	3.21±0.18^{a}	71.03±0.12^{d}	354.06±1.66^{a}	5.03±0.51^{d}
DN_B	7.11 ±0.08^{c}	1.13±0.14^{bc}	16.21±0.12^{a}	0.88±0.01^{d}	2.81±0.29^{f}	71.86±0.58^{c}	344.71.±0.78	8.54±0.45^{b}
LSD(0.05)	0.33	0.23	0.44	0.24	0.74	0.78	5.54	0.6

Mean value of triplicates ± standard deviation; value with same superscript on same column are not significantly different ($p<0.05$).

Keys: CC_S = 100% wheat (control), CC_A = OFSP: wheat (1:1), CC_B = OFSP: wheat (2:1), DN_S = 100% Wheat (control), DN_A= OFSP: Wheat (1:1), DN_B = OFSP: Wheat (2:1).

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OI2

Antioxidant Effect of Aqueous Extract of Watermelon (*Citrullus Lanatus*) Seeds in Paracetamol Induced Rats

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Keywords: antioxidants, *Citrullus Lanatus* seeds, free radicals and paracetamol

BACKGROUND AND OBJECTIVES:
Anti-oxidants are substances capable to mop up free radicals and prevent them from causing cell damage [1]. Free radicals have been implicated in the pathogenesis of a number of disorders such as: liver diseases, inflammatory disorder, carcinomas, cardiovascular diseases and diabetes mellitus [2]. *Citrullus lanatus* seeds are locally available and contain several bioactive compounds with medicinal properties [3]. In spite of the various nutritional and medicinal potential, watermelon seeds are often discarded while the fruit is eaten. The objective of the study was to evaluate the free radical scavenging potential of watermelon seeds.

MATERIALS AND METHODS:
EXPERIMENTAL DESIGN

GROUPS	TREATMENT(ORAL ADMINISTRATION	DURATION
Normal Control	Vital feed + water	8days
Negative Control	PCM + feed + water	PCM on day 1 + 7days feed and water
Preventive (200mg & 400mg)	Extract + PCM	7days extract + PCM on day 8
Curative (200mg & 400mg)	PCM + extract	PCM on day 1 + 7days extract

PCM= Paracetamol

Biochemical studies
Total protein was estimated using Lowry's method. Catalase (CAT) activity, Superoxide dismutase (SOD) and Reduced glutathione (GSH) concentration were measured using standard methods. The data obtained from protein concentration, catalase activity, superoxide dismutase activity and glutathione concentration were expressed as Mean ± SEM (Standard error of mean).

RESULTS AND DISCUSSION
As shown below the total protein content of the normal control was 7.42mg/ml and the value was higher than other groups except in the curative 400mg/ml group 7.59mg/ml. The catalase activity (mg/ml) for the normal control was 0.61 and was higher than 0.082, 0.04, 0.07, 0.35 and 0.185 for negative control, preventive and curative groups respectively. The SOD activity (U) for the normal control was 1.70, and the value was higher than 0.61, 1.30, 1.40, 1.55 for the negative control, preventive and curative (200mg) respectively, except for the curative group 400mg (1.75). Similarly the GSH (mg/ml) concentration for the

normal control was 14.64 and higher than 7.0, 7.94, 9.53, 8.47 and 11.55 for the negative control, preventive and curative respectively.

Table 1: **Scavenging Effect of Aqueous Extract of Water Melon Seeds on Free Radicals**

GROUPS	TOTAL (mg/ml)	CATALASE ACTIVITY (mg/ml)	SUPEROXIDE ACTIVITY (U)	GLUTATHIONE CONCENTRATION (mg/ml)
Normal control	7.42±0.36	0.61±0.013	1.70±0.21	14.64±4.51
Negative control	4.88±0.40	0.082±7.00	0.61±0.05	7.0±1.58
Preventive(200mg)	5.90±0.24	0.04±0.006	1.30±0.07	7.94±0.15
Preventive(400mg)	6.40±0.11	0.07±0.008	1.40±0.07	9.53±0.30
Curative(200mg)	5.39±0.12	0.35±0.050	1.55±0.15	8.47±0.30
Curative(400mg)	7.59±0.12	0.185±0.009	1.75±0.24	11.55±0.15

Mean ± SD values of the markers of oxidative stress

Results obtained in the present study indicated that administration of *Citrullus lanataus* seed extract in PCM-intoxicated rats had effectively ameliorated the decreased GSH contents toward normalcy. The scavenging potential may possibly be dependent on the number and locations of the hydroxyl groups in the phenolic compounds present in the extract [4] which is similar to the report of [5] which state that the free radical scavenging activities of the seed extract of *Citrullus lanatus* was as a result of the abundant presence of phytochemicals in them.

CONCLUSION AND RECOMMENDATION

Thus, from the analysis carried out it can be concluded that the antioxidants, SOD was found to have a more positive effect on reversing oxidative stress. We recommend further investigation on the toxicology of watermelon seeds to determine the safety of its consumption.

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OI3

Biochemical Effect of Varied Mixtures of Extracts of *Vernonia Amygdalina* (Bitter Leaf) and *Gnetumafricanum* (Okazi Leaf) on Alloxan Induced Diabetic Wistar Rats

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Key words: Extracts, bitterleaf, waterleaf, diabetes mellitus.

BACKGROUND/OBJECTIVE:

Diabetes mellitus is prevalent in many countries of the world, affecting all ages both in developing and developed nations. The use of plants in finding solutions to this problem has increased over the years(2).This study investigated the biochemical changes caused by combined leaf extracts of *vernonia amygdalina* (bitter leaf) and *gnetum africanum* (okazi leaf) on alloxan induced diabetic wistar rats.

MATERIALS AND METHOD:

Bitter leaf(BI) and Okazi leaf(OK) were purchased from Choba market Port Harcourt and identified at the Department of Plant Science and Biotechnology of the University of Port Harcourt, Rivers State,Nigeria.Aqueous exracts of the leaves were prepared using the conventional method.Fouty male wistar rats weighing between 150-180g were grouped into eight of five rats each. Group 1 was the normal control while diabetes was induced in groups 2-8.Group 2 (negative control) was not given any treatment while groups 3-7 were treated with varied mixtures of the two extracts at (BI/OK:10/90%), (BI/OK:30/70%), (BI/OK:50/50%), (BI/OK:70/30%) and (BI/OK: 90/10%) respectively. Group 8 served as the diabetic control and was treated with the standard drug (Metformin). *The body weights of the experimental animals were taken and blood glucose was determined on days, 0, 7, 14, 21 and 28.*The animals were sacrificed on the 28th day and blood samples collected and analysed for serum protein,lipid profile, serum electrolyte,urea, creatinine and haematological indices. The serum total protein was determined using Randox kits. The concentrations of triglycerides, total cholesterol, high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL) were estimated using standard enzymatic kits (Atlas medical). The sodium and chloride ions concentrations were evaluated with the Atlas Medical kits. The creatinine and urea amount were determined with the Randox kits and the haematological estimations were done using haematological auto analyzer (Sysmex KX-21N) following the manufacturers guideline. Analysis of variance (ANOVA) was used for data analysis.

RESULTS AND DISCUSSION:

There was a steady increase in the body weight(g) of the rats from the seventh day to the twenty-eighth day and combination (BI/OK:70/30)% showed the highest increase (175.40±1.28) while (BI/OK:50/50)% showed lowest increase (166.60±1.66).However, the difference was not significant ($p<0.05$). The result of the fasting blood sugar(mg/dl),Table 1,showed ratio and time-dependent reduction in all the treated diabetic groups with (BI/OK:90/10)% and (BI/OK:30/70)% combinations having the

highest(56.20±1.65) and least (120.60±4.73) reduction respectively. This implies that BI/OK ratio of 90:10 had the best activity in glycaemic control in diabetic-induced rats. There was a significant increase ($p<0.05$) in total blood protein concentration (g/dl) in all the treated groups but group 5 treated with (BI/OK:50/50)% combination had the highest increase (83.20±3.45) while group 6 treated with (BI/OK:30/70)% combination had least increase (62.80±2.59). There was a significant ($p<0.05$) reduction in the blood lipid profile of the diabetic groups (3-7) especially in triglycerides with the highest reduction in (BI/OK:50/50) % combination(0.70±0.07) while the least reduction was observed in (BI/OK:30/70)% combination (1.37±0.08). A significant decrease ($p<0.05$) was observed in the serum electrolyte (sodium and chloride) and in urea and creatinine. There were time and ratio-dependent variations in the haematological indices.

Table 1:**Effect of Combined Extracts on the Fasting Blood Glucose (FBG)**

GROUP	DAY0 (mg/d/L)	DAY7 (mg//L)	DAY14 (mg//L)	DAY21 (mg/dL)	DAY 28 (mg/dL)
NORMAL CONTROL	91.40±3.15^{b}	94.80±2.17^{b}	92.40±4.41^{b}	95.00±1.30^{b}	93.60±3.61^{b}
NEGATIVE CONTROL	279.20±36.88^{a}	301.20±28.84^{a}	281.60±16.07^{a}	258.20±11.49^{a}	171.20±6.01
BI/OK :10/90	218.20±11.33^{a}	195.00±10.82^{a,b}	180.40±10.70^{a,b}	164.00±9.23^{a,b}	118.00±6.71^{b}
BI/OK :30/70	209.80±14.93^{a}	201.00±14.07^{a,b}	181.60±12.56^{a,b}	162.20±11.77^{a,b}	120.60±4.73^{a,b}
BI/OK: 50/50	209.80±18.87^{a}	178.20±15.47^{a,b}	130.60±9.81^{b}	105.00±3.24^{b}	86.00±3.30^{b}
BI/OK :70/30	231.60±25.52^{a}	177.80±27.88^{a,b}	143.40±20.65^{b}	106.20±13.42^{b}	81.00±9.25^{b}
BI/OK: 90/10	230.80±23.00^{a}	177.60±20.77^{b}	131.40±17.59^{b}	90.80±10.67^{b}	56.20±1.65^{ab}
METFORMI N	284.20±36.21^{a}	221.60±29.43^{a}	148.00±18.47^{b}	109.60±14.82^{b}	69.40±8.83^{b}

Data are Mean± SEM. n=5.Values found in a column with superscript letter a, are significantly different ($p<0.05$) when compared to the normal control where as values with superscript b, are significantly different ($p<0.05$) relative to the negative control

CONCLUSION/RECOMMENDATION:

The results of this study showed time and ratio dependent effect on the parameters measured. Since the two plants are stable vegetables in some countries, their utilization particularly in appropriate combinations should be encouraged.

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OI4

Nutrients and Phytochemicals Composition of mMethanolic eExtract of fFour eEdible Spices cCommonly use in the Preparation of Soups in South-West Nigeria

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INTRODUCTION

Spices and herbs, also known as aromatic plants, are an important group of agricultural commodities being used by many civilizations all over the world to add flavor, taste, nutritional values and increase shelf life to food as well as to heal various physical, mental, emotional problems and to restore human health (1). One of the major features of traditional soups or local soups is the generous use of different spices such as garlic, ginger, turmeric, and curry leaf etc. not limited to traditional soup also in food preparation. Apart from their culinary purposes, some of these spices if quantifiably consumed can favourably compete with chemotherapy agent to play a role in human health because of their therapeutic potentials (2). The popularity of the it use of spices by the most consumers does not far fuel from the fact that it confer some nutritional benefits but they are majorly use for culinary ability. These spices are majorly uses in the cooking of food because of their aroma and the therapeutic properties they possess., sStudies on the impact of these spices confer in terms of nutrients, antioxidants and phytochemicals in food and soups have not been thoroughly study. Information on the chemical composition of some these spices use in the cooking of soups in southwest Nigeria is minimal and inadequate. Therefore, this study aimed to evaluate the Nnutrients and Pphytochemicals Ccomposition of methanolic extract of four edible Sspices commonly use in the Ppreparation of Ssoups in South-West Nigeria

MATERIALS AND METHODS

Procurement of Raw Materials

Ginger, garlic, Curry leaf and turmeric were purchased from Ojakoko in Owo Local Government, while curry leaves was purchased at shasha market, Akure, both in Ondo State. Each of the raw spices were thoroughly sorted, washed and diced into smaller pieces and air dry for 48 hours before they were transferred to a hot air oven at 60 °C^{oc} for 1 hour for further dehydration of the water content.

Chemical analysis

The moisture content, protein, ash, fat and crude fibre of the four spices were determined using a methods as described by AOAC (3) and Ccarbohydrate was determined by the difference. All the analyses were in triplicates determination.

Mineral Determination

The digest of the ash of each sample above as obtained in Mg, Fe, Zn, Se and Cu were determined ation using by Atomic Absorption Spectrophotometer (AAS)., Na and K were determined by flame photometer,

while phosphorus by calorimetric method (4). Iodine was determined by the method of Moxon and Dixon (4).

Phytochemical Determination

The methanolic extract was stored at 4°C until required and was used for phytochemical analysis. Total Alkaloids was determined by (12), Saponin by Sofowora, (13). The total flavonoids by Zhichen et al. (14), while Phytate was determined by the method described by Wheeler and Ferrel (15)

Statistical Analysis

The results were expressed as mean ± standard deviation and the test for statistical significance was carried out using one-way analysis of variance (ANOVA). Significant means was separated using Duncan's New Multiple Range Test (DNMRT) and differences was considered significant at ($p<0.05$).

Proximate and Phytochemicals composition of the four spices

The tTable 1 below shows that moisture content of the samples varieds slightly ranges from (9.2083 to 11.4167%). Ginger had the highest ash content (5.26%) and significantly ($P<0.05$), different from other samples. In terms of fat and crude fibre, curry had the highest values, that is, 4.73% and 4.38%, respectively for fat and crude respectively . Ginger (13.13%) had the highest protein content, while the garlic (6.38%) had the least value. Polyphenol, saponin, flavonoids and phytate were significantly ($p<0.05$) higher in curry powder, while turmeric had the highest value for alkaloid (60.32%), and wereas significantly ($p<0.05$) different ($p<0.05$) from other spices. Ginger had the least value for phytate followed by turmeric. Garlic was significantly different ($p<0.05$) in alkaloid (22.43% than other spices.

Mineral composition of the spices (Turmeric, Ginger, Curry and Garlic) per 100g dry weight

The mineral content of the sample is shown oin tTable 2. Iodine, selenium, magnesium, phosphorus and copper were significantly ($p<0.05$) higher in garlic than had the below shows that was significant different ($p<0.05$) from other spices. Curry had the highest value in for potassium, while ginger had the highest sodium content, followed by turmeric. Turmeric had the highest value for zinc (3.76mg/100g) and iron (3.33mg/100g) and they were significantly different ($p<0.05$) from the other spices.

DISCUSSION

The parameters hereby determined confirm that these spices don't just add colours and aroma to food and soups alone but also confer some nutritional benefits and appreciable amount of phytochemical to soups and food. The present study has shown that the spices used in the preparation of traditional soups examined in this study have high content of crude protein, with low fat, content and crude fibre and appreciable amount of essential minerials like . The ash contents were of moderate in values, the spices also contained good minerals with abundance of them in calcium, magnesium, sodium, and potassium, while they were least in copper, selenium and iodine and manganese. The bioactive phytochemicals components of in the spices make them a good source of nutraceuticals active ingredients for drugs and nutritional supplements. The present study established that these traditional result suggest that the spices contain protein, vital minerals and bioactive compounds that could be of nutritional and health benefits. Hence their regular intake may prevent oxidative stress and associated diseases if use properly in the preparation of soups and meal in sufficient amount would contribute greatly towards meeting human nutritional requirement for normal growth and adequate protection against diseases.

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Table 1: Proximate composition of the spices (Turmeric, Ginger, Curry and Garlic) per 100g dry weight

Proximate (g/100g	Turmeric	Ginger	Curry	Garlic
Moisture (%)	10.48± 0.042^{b}	10.63±0.037^{b}	9.20±0.226^{c}	11.41±0.521^{a}
Ash (%)	4.16± 0.010^{d}	5.26± 0.04^{a}	4.53±0.030^{bc}	4.93±0.630^{b}
Fat (%)	3.82±0.026^{c}	4.50±0.011^{b}	4.73±0.008^{a}	1.23±0.288^{d}
Crude fibre (%)	4.36± 0.052^{ab}	3.92±0.302^{c}	4.38±0.005^{a}	2.26±0.062^{d}
Protein (%)	11.59± 0.22^{b}	13.13±0.026^{a}	7.85±0.009^{c}	6.38± 0.025^{d}
Carbohydrate (%)	65.66±0.095^{c}	62.53± 0.103^{d}	69.28± 0.015^{b}	73.77±1.331^{a}
Alkaloid (%)	60.32±.049^{a}	51.53±5.78^{b}	28.28±.026^{c}	22.43±.068^{d}
Polyphenol (%)	25.05±.050^{b}	20.36±.115^{c}	27.18±15.19^{a}	18.64±0045^{d}
Saponin (%)	0.28 ±.004^{c}	0.21±.004^{d}	0.35±.009^{a}	0.325±.001^{b}
Flavonoids (%)	6.15± 0.03^{c}	4.88±.024^{d}	7.12±.006^{a}	6.38±.029^{b}
Phytate (%)	0.74±.051^{c}	0.58±.013^{d}	1.23±.057^{a}	0.84±.015^{b}

Values are mean ± standard deviation of triplicate analyses. Values with the same superscript in the same columns are statistically not significant at ($P<0.05$).

Table 2: Mineral composition of the four spices (Turmeric, Ginger, Curry and Garlic) per 100g dry weight

Minerals	Turmeric	Ginger	Curry	Garlic
Na(mg/100g)	28.46±0.058^{b}	35.56±0.115^{a}	22.56±0.115^{c}	17.06±0.153^{d}
Ca(mg/100g)	181.66±0.153^{b}	72.56±0.057^{d}	95.10±0.100^{c}	183.20±0.100^{a}
K(mg/100g)	405.43±0.321^{b}	374.46±0.153^{d}	570.53±0.058^{a}	401.16±0.076^{c}
Zn(mg/100g)	3.76±0.003^{a}	1.36±0.031^{c}	1.86±0.010^{b}	1.14±0.020^{d}
Mg(mg/100g)	12.72±0.026^{c}	10.70±0.107^{d}	14.27±0.027^{b}	25.22±0.233^{a}
P(mg/100g)	72.60±0.048^{d}	131.91±0.260^{c}	150.73±0.011^{b}	153.15±0.050^{a}
Fe(mg/100g)	3.33±0.071^{a}	2.28±0.068^{b}	1.40±0.009^{d}	1.70±0.009^{c}
Cu(mg/100g)	0.17±0.002^{c}	0.03±0.003^{b}	0.10±0.004^{c}	0.53±0.061^{a}
Se(mg/100g)	0.02±0.003^{b}	0.03±0.002^{b}	0.01±0.01^{b}	10.11±0.076^{a}
I(mg/100g)	2.85±0.006^{d}	4.26± 0.007^{b}	3.72±0.019^{c}	4.40±0.051^{a}

Values are mean ± standard deviation of triplicate analyses. Values with the same superscript in the same columns are statistically not significant at ($P<0.05$).

PI6

Comparative Study on the Proximate Composition of Indigenous Sweet Potato and Orange Fleshed Sweet Potato *(Ipomoea batatas (L.) Lam)* in Abeokuta Metropolis

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Keywords: Proximate composition, Orange Fleshed Sweet Potato (OFSP), cooking methods, Indigenous Sweet Potato.

Background and Objectives

The promotion of Orange Fleshed Sweet Potato (OFSP) production and consumption has become one of the new initiatives for vitamin A deficiency control adopted in many African countries. This is based on evidence that OFSP are not only easy to cultivate, but also provide an adequate amount of Vitamin A to promote health among the general population (1, 2). However, very little work has been done on the introduction of orange fleshed sweet potato in Ogun State. The objective of this study is to compare the proximate composition of indigenous sweet potato and OFSP prepared using three cooking methods.

Materials and Methods

Indigenous sweet potato and OFSP were obtained from farmers market at Abeokuta, Ogun State, Nigeria.Weighed samples of indigenous sweet potato and OFSP were boiled at 100°C for 35 minutes, baked at 350°C for 1hour 20 minutes and fried at 180°C for 5 minutes. Proximate analysis was carried out according to the Association of Analytical Chemist (AOAC) procedures (3) on samples of boiled, baked and fried potatoes. All data were subjected to statistical analysis using SPSS with p-value<0.05 considered as significantly different.

Results and Discussion

The result on table 1 shows that the baked sample of OFSP recorded the highest moisture content of 72.0 ± 0.26. Boiled indigenous sweet potato recorded the highest protein content of 5.39±0.03, followed by OFSP with 4.53±0.02. Fried indigenous sweet potato sample recorded the highest fat content. Both the boiled sample of Indigenous sweet potato and OFSP recorded the highest fibre content of 2.25±0.04 and 2.13±0.04 respectively. Presence of ash was higher in samples of the indigenous sweet potato when compared to OFSP sample. Indigenous sweet potato had greater carbohydrate content of 24.33±0.20 than orange-fleshed sweet potato (18.87±0.26).

Table 1:Proximate composition of Baked, Boiled and Fried Indigenous Sweet Potato and Orange Fleshed Sweet Potato (OFSP) *(Ipomoea batatas (L.) Lam)*) (Dry Matter Basis)

Samples (%)	Moisture	Protein	Fat	Fibre	Ash	Carbohydrate
Bake	59.61±0.28^{b}	4.53±0.06^{b}	0.43±0.02^{a}	1.99±0.21^{b}	2.39±0.02^{b}	31.07±0.15^{b}
Bake(OFSP)	70.22±0.03^{b}	3.58±0.06^{b}	0.39±0.01a	1.84±0.02^{b}	2.20±0.01^{b}	21.73±0.06^{c}
Boil	65.48±0.18^{c}	5.39±0.03^{c}	0.35±0.02^{a}	2.25±0.04^{c}	2.20±0.02^{a}	24.35±0.19^{a}
Boil(OFSP)	72.00±0.26^{c}	4.53±0.02^{c}	0.30±0.02^{a}	2.13±0.04^{c}	2.07±0.02^{a}	18.87±0.19^{b}
Fry	36.43±0.29^{a}	1.79±0.03^{a}	25.73±0.31^{b}	1.22±0.01^{a}	2.61±0.04^{c}	32.23±0.60^{b}
Fry(OFSP)	55.11±0.66^{a}	1.51±0.02^{a}	22.84±0.08^{b}	1.01±0.03^{a}	2.28±0.07^{c}	17.59±0.08^{a}

Values are means of duplicate determination ± SD. Means on the same column with different superscript differed significantly ($p<0.05$).

CONCLUSION AND RECOMMENDATION

Aside from its Vitamin A bio-fortification benefit, the consumption of OFSP should be encouraged for its protein content, which can help augment the recommended dietary intake of protein (4). Lowered carbohydrate content observed in boiled OFSP sample (18.87 ± 0.19) when compared to that of the indigenous sweet potato (24.33 ± 0.19), this can make boiled OFSP a suitable meal for diabetic patients.

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PI7

Evaluation of sensory attributes of cereal-base foods (Tuwo Masara and Tuwo Shinkafa) enriched with Bambara nut (Vigna subterranean) flour

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Introduction

Malnutrition is widespread in the entire country. Rural areas are especially vulnerable to chronic food shortage, unbalance nutrition, poor quality and high cost of food (Akinyele, 2009) [1]. The prevalence of PEM is attributed to many factors such as the high price of animal protein (eggs, meat and milk). Cereals and cereals product are important human food sources worldwide and is the main sources of carbohydrate and proteins but are limiting in some essential amino acids. The enrichment of the cereals with legumes such as soya beans or groundnuts has been reported (Coulibaly *et al.*, 2011) [2]. Legumes play an important role in the traditional diet of most third world countries and can be complemented with cereals to enhance the quality of their protein (FAO 2016) [3]. This study therefore developed and evaluated sensory attributes of cereal-based foods (Tuwo Masara and Tuwo Shinkafa) enriched with Bambara nut (*Vigna subterranean*) flour

Materials and Method

Bambara nut, Maize and Rice were purchased from Muda Lawal market in Bauchi. The method described by (Ihekoronye and Ngoddy, 1985) [4] with modification was used in the production of the flours. To prepare Tuwo masara, maize flour (100 g) and Bambara nut flour (10 g) in a bowl, add small amount of water (250 ml) and stir to make a paste. The slurry was added to boiling water (750 ml), with continuous stirring to avoid lumps formation for 25 minutes. Little amount of the flour was added to the slurry until desired consistency was achieved.

Rinse the rice (100 g) in cold water, put in a sizeable pot and enough water was added to cover the rice and cooked until the rice was softened with some amount of water in it. After, Bambara nut flour was added, stirred very well, and allowed to steam for some minute and then served. The prepared meals and controls (100% tuwo masara and tuwo shinkafa) were subjected to sensory evaluation as described by Ijarotimi and Keshinro (2012) [5] using 20 panelists in the Nutrition and Dietetics Departments of Federal Polytechnic Bauchi. The diet samples were coded as CTM (100%: Tuwo masara only), TMA (90:10: Tuwo masara + Bambaranut), TMB (80:20: Tuwo masara + Bambaranut), TMC (70:30:Tuwo masara + Bambaranut), CTS (100%:Tuwo shinkafa only), TSD (90:10:Tuwo shinkafa + Bambaranut), TSE (80:20:Tuwo shinkafa + Bambaranut) and TSF (70:30: Tuwo shinkafa + Bambaranut). The samples were evaluated for aroma, colour, texture and overall acceptability using a nine point hedonic scale in which 1 represents the least score (dislike extremely) and 9 the most desirable score (like extremely) for all attributes.

Results

The sensory attributes of formulated food samples are presented in Table 1. The result showed that there was no significant ($p<0.05$) difference in terms of aroma and taste between all the samples and the control.

However, TMC and TSF were rated higher when compared to other food samples including control samples. Conclusion: The present study established that TMC and TSF samples were most preferred in terms of in overall acceptability. Hence, these food samples may be suitable for replacement for the convectional Tuwo Masara and Tuwo Shinkafa, and also for the prevention of protein-energy malnutrition.

Table 1: Result of the Sensory evaluation of tuwo masara and tuwo shinkafa values with the same superscript down columns are not significantly different (P≥0.05)

Control TM	$8.45^{a}\pm0.9$	$7.95^{a}\pm1.15$	$8.15^{a}\pm0.2$	$7.15^{a}\pm1.23$	$7.75^{a}\pm 1.74$
TMA	$7.2^{b}\pm 0.95$	$7.2^{a}\pm 0.95$	$7.35^{b}\pm 0.18$	$7.19^{a}\pm 1.59$	$7.75^{a}\pm 0.97$
TMB	$6.8^{b}\pm 0.44$	$6.8^{a}\pm 1.43$	$7.15^{b}\pm 0.49$	$7.3^{a}\pm 1.56$	$7.35^{a}\pm1.42$
TMC	$7.0^{b}\pm0.78$	$7.0^{a}\pm1.78$	$6.45^{c}\pm0.33$	$7.05^{a}\pm 1.73$	$7.90^{a}\pm 1.55$
Control TS	$7.0^{b}\pm0.03$	$7.20^{a}\pm1.01$	$6.75^{b}\pm0.21$	$6.70^{b}\pm1.2$	$7.00^{a}\pm 1.71$
TSD	$8.0^{ab}\pm0.50$	$8.0^{a}\pm 1.45$	$7.95^{a}\pm0.33$	$7.95^{ab}\pm 0.60$	$7.90^{a}\pm 1.55$
TSE	$7.6^{b}\pm0.73$	$7.6^{a}\pm1.72$	$7.70^{a}\pm0.26$	$8.15^{a}\pm0.14$	$8.15^{a}\pm1.03$
TSF	$7.9^{b}\pm0.48$	$7.9^{a}\pm1.48$	$7.8^{a}\pm0.27$	$8.0^{a}\pm0.17$	$8.20^{a}\pm 0.91$

Key: CTM (100%: Tuwo masara only), TMA (90:10: Tuwo masara + Bambaranut), TMB (80:20: Tuwo

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OI8

Proximate Composition and Sensory Evaluation of Snacks (Chinchin and Buns) Enriched with Tigernut (*Cyperus esculentus*) and Coconut (*Cocos nucifera*) Milk.

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Keywords: Evaluation, Tigernut, Coconut, snacks.

Background to the study and objectives:
There is an increased in the consumption of snacks from refined grains rich in added sugar, added fat and calories especially among children and adolescents. This is because these snacks are inexpensive, palatable and convenient (1). Frequent consumption of these snacks available in fast food centers, on the streets and in the open market has given rise to obesity, type -211 diabetes and other deficiency diseases. The World Health Organization (2) has found sufficient evidence to link high consumption of energy-dense foods with the global obesity pandemic. Enriching snacks with milk from tiger nut and coconut as against the milk flavor and other milk sources used in the production of commercial snacks producers use in snack production will go a long way to improve the nutrient density status of these the snacks thus providing a healthier snack for all age groups especially children and adolescents. It is upon this background that the present study aimed intends to determine the proximate composition and sensory attributes of chinchin and buns enriched with tiger nut and coconut milk.

Materials and methods:
The study used the experimental study design. Tiger nut and coconut were purchased from the Relief market in Owerri, Imo State. The milk extracted from the They were processed and their milk extracted from them using water. The milk of each of the tiger nut and coconut, wereas used to replace both the water and milk quantities in the standard chin chin and buns recipes, respectively. The control samples wereas chinchin and buns produced from the standard recipes. The experimental samples (Cchinchin and buns) and the control samples produced with tigernut milk, those produced with coconut milk and those produced using the standard recipe were produced using frying method of food preparation. The samples se products were analyzed for proximate composition using standard methods. Sensory attributes of the samples were evaluated They were also subjected to sensory evaluation by by 20 panelists using 9-point hedonic scale. Data The results obtained were statistically analysed and results were presented in using mean and, standard deviation using and statistical package for service solution version 22. Difference between the means was considered significant at when P= 0.05.

Results and Discussion:
The results showed that moisture content of the control chinchin and buns were significantly ($p<0.05$) higher (5.90 ± 0.38^{a} and 27.27 ± 1.66^{a}) than the moisture content of coconut milk enriched chinchin and buns (3.12 ± 0.38^{e} and 3.89 ± 0.03^{e}), respectively and tiger nut milk enriched chinchin and buns (15.35 ± 1.15^{c} and 18.86 ± 1.05^{c}), respectively. The Hhigh moisture content of the control samples showeds that they samples had lower shelf life are more perishable than the coconut milk and tiger nut milk enriched samples. Protein content (9.92 ± 0.85^{a} and 13.21 ± 0.19^{a}) of tiger nut milk enriched chinchin and buns were

significantly higher than the control chinchin and buns (7.99± 0.36[a] and 11.32± 0.19[b]) and also coconut milk-enriched chinchin and buns (5.56± 0.90[f] and 8.69± 0.28[d]). The increase in protein content of tiger nut enriched chinchin and buns were because of the tiger nut, which is moderately rich in protein (7.15g/100g) (3). This result agreeds with the works of (4) who found an increased in the protein content of tiger nut enriched plantain meal dough (from 13.50±0.07 to 23.93±0.10). Coconut milk enriched chinchin was significantly higher in fat (17.86± 0.33[a]), fibre (1.26±0.16[a]), ash (1.84± 0.05[a]) and energy (464.42± 0.3[a]) contents than coconut milk enriched buns (15.02±0.76[b], 0.96± 0.95[b], 1.22± 0.06[b], 450.82± 0.26[b], respectively) and the control (13.77± 0.35[c], 0.25± 0.02[c] and 326.99± 0.32[c], respectively). Coconut milk enriched buns was also significantly higher in fat (9.92±0.39[d]), fibre (2.14±0.26[a]), ash (0.43±0.07[a]) carbohydrate (63.47±1.19[c]) and energy (377.92±0.32[a]) value than the control chinchin and buns, respectively. High fat and energy value of coconut enriched samples may be due to high fat content of coconut., thus its high energy value. The fat in coconut milk is mostly in the form of medium chain saturated fatty acids (MCSFAs),. that is abundant in mother's milk, in particular lauric acid. This acid is converted to a highly beneficial compound called monolaurin. This result is in line with the findings of (5) who reported found out that foods enriched with coconut milk have improved nutrient quality. All the sensory attributes were not significantly different including the overall acceptability. Hence, the food products They were all acceptable to the panelists.

Table 1: Proximate composition of chinchin enriched with coconut milk, tiger nut milk and the control sample

Nutrient	Control chinchin	Coconut milk chcinchin	Tigernut milk chinchin
Moisture (g/100g)	5.90±0.38[d]	3.12±0.18[e]	3.89±0.03[e]
Protein (g/100g)	7.99±0.36[e]	5.56±0.49[f]	9.92±0.85[c]
Fat (g/100g)	13.77±o.35[c]	17.86±0.35[a]	15.02±0.76[b]
Fibre(g/100g)	0.25±0.02[b]	1.26±0.16[a]	0.96±0.09[b]
Ash(g/100g)	0.51±0.02[c]	1.84±0.05[a]	1.22±0.06[b]
Carbohydrate (g/100g)	71.57±0.94[a]	70.36±0.64[ab]	68.99±1.49[b]
Energy (kcal/100g)	326.99±0.32[c]	464.42±0.43[a]	450.82±0.26[b]

Values with different superscripts in each column are significantly different (P< 0.05)

Table 2: Proximate composition of buns enriched with coconut milk, tigernut milk and the control

Nutrient	Control buns	Coconut milk buns	Tigernut milk buns
Moisture (g/100g)	27.27±1.66[a]	15.35±1.15[c]	18.86±1.05[b]
Protein (g/100g)	11.32±0.19[b]	8.69±0.28[d]	13.21±0.19[a]
Fat (g/100g)	7.87±1.00[c]	9.92±0.39[d]	9.54±0.16[d]
Fibre(g/100g)	0.51±0.06[d]	2.14±0.26[a]	1.89±0.22[d]
Ash(g/100g)	0.31±0.04[d]	0.43±0.07[c]	0.34±0.20[d]
Carbohydrate (g/100g)	52.72±1.59[e]	63.47±1.19[c]	56.16±1.01[d]
Energy (kcal/100g)	326.99±0.34[c]	377.92±1.02[a]	363.34±0.51[b]

Values with different superscripts in each column are significantly different (P< 0.05)

Conclusion and Recommendation:

Coconut and tigernut milk enriched chinchin and buns showed improvement in their macronutrient contents (protein, fat, fibre, ash, carbohydrate and energy) more than the control samples. The sensory attributes of the enriched samples were also as acceptable as the control samples. The study recommends that coconut and tiger nut milk be incorporated in every day meals for improved and enriched meals.

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PI10

Mineral Content and Health Risk Assessment of Date Fruit (*Phoenix dactylifera*) Sold in Dutse, Jigawa, Nigeria

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Introduction

*Date fruits (Phoenix dactylifera) consumption have significant human health benefits due to the presence of minerals and other constituents (*Jain *et al., 2011). The fruits may be contaminated with heavy metals and other contaminants during field, processing, transportation or storage posing health challenges to consumers (*Salama *et al, 2019). Hence, current research explored the mineral contents and health risk associated with intake of date fruits sold in Dutse, Jigawa State-Nigeria. The Date fruit were collected from market and identified.*

Materials and Methods

The Date fruit were collected from market and identified. The sample was shade dried and crushed into powder, and the minerals content of Date fruits (Dan Jigawa) were determined using standard procedure.
A spectra A-40 model atomic absorption spectrometer, PSC-56 programmable sampler changer, Epson Lx-80 printer, and Zn, Fe and Ca hollow cathode lamps from variants were used in the procedure (Lisheng-lian, 1985). Human health risk of heavy metals by consumption of metal contaminated Date fruits is determined by hazard quotient (HQ) and target hazard quotient (THQ) (USEPA, 2006).

Results and Discussion

A mean level of Sodium, Potassium, Calcium, phosphorous, magnesium was observed in Dan Jigawa Date fruits as 0.04±0.00, 0.79±0.02, 4.71 ±0.06,10.0± 0.24 and 0.48 ±0.02 mg/kg respectively. The iron, copper, zinc, Manganase and Cobalt levels were 0.47±0.01, 0.68±0.04, 1.45±0.01, 0.61±0.05 and 0.17±0.01mg/kg respectively.

The health risk assessment (non-carcinogenic): Iron, copper, zinc, Manganase and Cobalt) showed that all the hazard quotients (HQ) is below 1, with Target Hazard Quotient(THQ) of 0.962, signifying the safety of Dan Jigawa dates fruit cultivar. A local study conducted by (Babandi *et al*., 2019) on non-carcinogenic and carcinogenic risk potentials of metals exposure from vegetables grown in sharada industrial area kano. The metal concentrations for both carcinogenic and non-carcinogenic were determined some were found within the acceptable values while others above the stipulated range by WHO, consequently signifying the area is unsafe for cultivating dietary vegetables because of heavy metals pollutions and risk of exposing the consumer population and thus contradicts our findings were the total hazard quotient is less than one (1).

Conclusion

The intake of Dan jigawa date fruits was nutrionally important and toxicologically safe.

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PI11

Assessment of Nutrient Content and Acceptability of Cookies from Plantain, Cocoyam and Soybean Flour Blends

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Keywords: Snacks, Cookies, Composite Flour, Sensory evaluation

Background and Objective:

Ready-to-eat baked snacks consumption is on the rise with imported wheat being the major ingredient. Several researches have been centred on production and use of composite flour with or without wheat, supplemented with flour from locally sourced food materials like roots, tubers, cereals and legumes [1, 2, 3]. The use of composite flour helps in providing nutrient dense products. This study was carried out to produce acceptable and healthy cookies from plantain, cocoyam and soybean composite flour and evaluate the nutrient composition and acceptability of cookies produced at various ratios of blends of the three flour.

Materials and Methods:

Unripe plantain and cocoyam were purchased from Oje market, while soybean and other ingredients were purchased from Bodija market, both in Ibadan, Oyo State, Nigeria. The plantain and cocoyam were washed, peeled, sliced, oven dried at 60^{0}C, milled into flour and sieved into fine particles [4, 5]. The

soybean was winnowed, sorted, blanched at 75°C, dehulled, decanted, oven dried at 65°C, milled and sieved to get fine flour. Composite flour of plantain, cocoyam and soybean were formulated using the ratio 80:15:5, 70:25:5, 60:35:5, 50:45:5 and 100% of each flour. Each flour blend was used to produce cookies. Proximate, mineral, anti-nutrients, vitamins, physico-chemical properties and microbial content of the flour blends were determined using standard methods. Sensory evaluation of products was carried out using twenty-five untrained panelists to assess the colour, taste, flavour, crispiness and overall acceptability on 9-point hedonic scale. Data obtained were analyzed using means and one-way ANOVA.

Results and Discussion:

The use of the composite flour improved the nutrient content of the cookies. A 100g of sample contained 5.9 - 8.1g moisture, 12.2-15.3g protein, 0.3-0.9 crude fibre, 8.2-9.1g fat, 1.9-2.3g ash, 66.4-68.8g carbohydrate, and 430–460kcal gross energy content. The cookies showed appreciable increase in mineral and vitamin content of products with reduction in the anti-nutritional factors with increasing level of inclusion of cocoyam flour. The microbial counts (2.07 – 3.33 x10^1 cfu/g) of the products were very low, while the functional properties of the flour blends showed good quality that qualify them for confectionery use.

Conclusion and Recommendation:

All the cookie samples were acceptable, with the 60:35:5 cookie having the best overall acceptability; and hence are recommended as good nutrient-dense snacks for consumption.

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PI12

Natural Remedy for Malaria Using Functional Food

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BACKGROUND AND OBJECTIVES

Malaria is preventable and curable by natural remedies using species and herbs (Bodeker G *et al)*. Natural remedies using spices and herbs have been used to treat malaria for thousand of years and are source of the two main groups (artemisinin and quinine derivatives) of modern anti-malaria drugs https://www.who.int/.With the problem of increasing level of drug resistance and difficulty in poor areas of being able to afford and access effective anti-malaria drugs, natural remedies could be an important and sustainable source of treatment with no adverse and harmful side effect using herbs and species (World malaria report, 2019).

Herbs and spices such as the utazi leaf (*Gongronema latifolium*)saffron (*Crocus sativus*) and uziza leaf (*piper guineense*) which are rich in phytochemicals such as Quinine, alkaloids, saponins and flavanoids which has high gametocydal activity in addition to high asexual efficacy against the malaria parasite. The objective of the study is to show and obtain natural remedy for malaria fever through the use of herbs and spices that is affordable.

Materials and Method

Ten individuals were selected who had malaria illness symptoms and laboratory test result showing positive for malaria parasite count. Each were given the functional food to consume with dose description such as add one teaspoon of the above composed product into 250mls of a bit hot clean water and consume morning and night for three days consecutively in a week.

Result

When consumed in the doses described above, individuals showed a highly positive clinical response of wellness such as no fever, chills, cold, coughs, oddness, muscular ache e.t.c associated with malaria and laboratory test result for malaria plasmodium parasite showed negative parasite count after consumption.

Conclusion and Recommendation

The functional food product comprising utazi leaf, saffron and uziza leaf, demonstrated properties of highly efficacious gametocydal and asexual efficacy to the malaria plasmodium parasite and thus can help in the fight to reduce malaria transmission, illnesses and death / mortality.

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PI13

Nutrition Intervention and New Food Product Development through the Use of Locally Formulated, Produced and Registered Functional Foods and Ready To Use Nutritional Food (RUNF) for Maternal, Infant Child, Adolescent and the Aged Health Care

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KEYWORDS: Malnutrition, Non- Communicable diseases, Functional food, Ready to use Nutritional Food (RUNF)

BACKGROUND AND OBJECTIVES

Nutrition is the science that interprets the nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism which include digestion, absorption, assimilation, biosynthesis, catabolism and excretion for proper nourishment of the human body as essential and key to healthy living from infancy, childhood, adolescent to adulthood whereas Malnutrition is recognized as a global problem which weakens immune system and worsens illness when an individual eats less than the nutrient requirement (under nutrition) and more than the nutrient requirement (over nutrition). https://en.m.wikipedia.org>wiki. Also a micro-nutrients deficiency is seen in cases of malnutrition. Children that are picky eaters have the tendency of being malnourished and therefore the RUNF (Ready to use Nutritional Food) serves as a supplementary food for them for Nutrition Intervention.

The objective of the study is to tackle malnutrition such as hidden hunger, obesity, non-communicable diseases (high blood pressure/hypertension, High Blood Sugar /hyperglycemia) through the use of locally formulated, produced and registered functional foods and ready to use nutritional food (RUNF) for infants, children, adolescent and adults without medical complications as a new food product/ development away from the usually imported functional foods and supplementary feeding program as a means of nutrition intervention and wellness promotion for maternal, infant, child, adolescent and the aged health care where and when necessary with targeted parameter without the intention of replacing medical prescription.

MATRIALS AND METHOD

A selection of 3 under 5's and 10 adults who needed intervention was done. A shaker strip was used to check the mid-upper arm-circumference of under five (5) children and the result obtained were recorded before and after administration of the ready to use nutritional food (RUNF) which constitutes peanut (50g), cashew nut (20g), flaxseed oil (20g) and fructose (10g).

Also the BMI, blood pressure, blood sugar of adults were checked and recorded to assess the nutritional status before and after functional food administration which constitutes beetroot extract (50g), saffron (20g), fennel (10g) and cardamom(10g) where necessary .

The results obtain is shown as follows;
In the table below.

Parameters	Control	Before Consumption	After 5 days
MUAC	> 13.5	12.5	13.5
BMI	18.5 – 24.5kg/m^2	26.0 – 30kg/m^2	22.5kg/m^2
Blood pressure	120/70 – 130/80 mmHg	140/100 – 150/105mmHg	$\pm$130/70mmHg
Blood Sugar	4.0 – 5.9mmol/l	6.0 – 8.0mmol/l	5.0mmol/l

CONCLUSION AND RECOMMENDATION

This study thus reveals the underlying advantage of using our locally formulated, produced/manufactured and registered functional food and RUNF (Ready to use Nutritional Food) to address the challenges of malnutrition and it's effects.

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PI14

Comparative Study on Phytochemical and Antioxidant Properties of Three Different Species of Onion (*Allium cepa*)

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Keywords: *Allium*, phytochemical, antioxidant, therapeutic activities.

BACKGROUND AND OBJECTIVES:

Onion belongs to the family of *Alliaceae*[1]. It is a well-known vegetative which is used in our daily meals for its nutritional values[2]. It is highly valued for its therapeutic properties[3]. Onion is the most widely cultivated species of the genus *Allium* due to its various possible applications of the crop. Thus, this study was aimed to determine phytochemicals and antioxidant properties of the three different varieties i.e. white, brown and purple onions.

MATERIALS AND METHOD:

The bulbs were cut into small parts and mashed with mortar and pestle. Each of the samples was allowed to stay settled inside 200 mL of 90% ethanol, filtered and the filtrate evaporated at 100°C and the phytochemicals and antioxidant were analyzed using UV-Spectrophotometry method.

RESULTS AND DISCUSSION:

The phytochemical screening of the white, brown and purple onions showed the presence of alkaloids, saponins, flavonoids, terpenes, anthraquinones, cardiac glycoside, steroids, tannins, etc while chalcone was absent in the white and brown onions but present in trace amount in purple onion. The highest value of

alkaloids was recorded in the purple onion (0.358 ±0.002%) followed by brown (0.281±0.003%) and white (0.223±0.002%). The amount of tannin present in the purple onion was 0.047±0.001% followed by brown onion (0.036±0.002%) and white onion (0.020±0.001%) respectively.

Table 1: Phytochemical composition of ethanolic extract of white, brown and purple onions (%)

Phytochemical	White Onion	Brown Onion	Purple Onion
Alkaloid	0.223±0.002	0.281±0.003	0.358±0.002
Tannin	0.020±0.001	0.036±0.002	0.047±0.001
Saponin	0.003±0.000	0.024±0.002	0.108±0.001
Flavanoid	0.003±0.000	0.021±0.001	0.031±0.006
Anthraquinone	0.051±0.002	0.078±0.002	0.006±0.001
Steroid	0.039±0.002	0.084±0.002	0.011±0.000
Terpene	0.016±0.001	0.056±0.001	0.079±0.002
Chalcone	0.000±0.000	0.000±0.000	0.001±0.000

Table 2: Antioxidant composition of ethanolic extract of white, brown and purple onions

Parameters	White Onion	Brown Onion	Purple Onion	Ascorbic Acid Standard
Reducing Power (mg/mL)	0.154±0.001	0.166±0.002	0.180±0.002	0.194±0.002
DPPH Scavenging Activity (%)	41 86±0.015	58.81±0.015	82.78±0.015	93.06±0.015
Total Phenolic (mg/mL)	0.868±0.001	0.960±0.002	1.049±0.002	1.153±0.001

This study further revealed that the ethanolic extract of purple onion showed relatively highest phytochemicals and antioxidant values when compared to the extract of white and brown onions.

CONCLUSION AND RECOMMENDATION(S):

As a result of the presence of phytochemicals in appreciable amounts, this study therefore supports the therapeutic activities of onions against array of diseases while their antioxidant properties can prevent number of diseases which could be termed as part of the health benefits derivable from onion. However, it can be concluded from this study that purple onion has an efficient and effective phytochemicals and antioxidant properties than the white and brown onions and hereby recommended to be consumed more.

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OI15

Evaluation of the Chemical Composition and Anti Nutritional Factors (ANFs) in Different Thermally Processed *Detarium senegalense* (Tallow) Seed Flour

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ABSTRACT

Introduction: *Detarium senegalense* JF Gmelin (Caesalpiniaceae) seed, commonly known as tallow, is used traditionally as a soup thickener in Eastern Nigeria. Despite its high protein content its seed is under-utilized due to the presence of anti-nutritional compounds. Objective: This study investigated the effect of different thermal processing methods on the nutritional and antinutritional properties of *Detarium senegalense* seed flour. Methods: Freshly purchased seeds were washed and divided into four portions. The first was boiled, the second was microwaved, third was autoclaved while the fourth was roasted. The processed samples were analyzed using standard procedures. Data obtained were statistically analyzed using Analysis of variance (ANOVA). Duncan's multiple range test was used to compare the means. Significance was accepted at ($p \leq 0.05$). Result: Moisture content ranged from 7.83% to 11.47%, ash content ranged from 1.97% to 2.36% while protein ranged from 16.43% to 19.84%. the highest value for fat was obtained in microwave samples 1.76% while the lowest was obtained in boiled samples1.68 %. crude fibre was highest with roasting (2.06%) while boiling gave the lowest value 1.87%. carbohydrate content ranged from 64.52% to 68.69%. The amino acid analysis revealed that the samples were superior with respect to Arg, Leu and Phe when comparing the essential amino acids in the studied samples with the recommended FAO/WHO provisional pattern but their contents appreciated after boiling. Generally, there was a significant ($p \leq 0.05$) reduction in tannin, phytate and trypsin inhibitors, however boiling method was most effective while autoclaving was least effective. In vitro protein digestibility was more preserved with boiling samples (75.49%) and least in roasting samples (63.86%). Conclusion: The results showed that thermal processing increased the nutritional value of *Detarium senegalense* seed flour by reducing anti-nutrients thereby making them a good source of protein. Key words: Proximate composition, amino acid profile, anti-nutritional factors, *Detarium senegalense*.

OI16

Effect of *Telfaira occidentalis* (Ugu) dietary supplement on some haematological parameters and tissue iron stores of female mice before and after gestation

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KEYWORDS: Haematological parameters, iron, gestation, supplementation

BACKGROUNDAND OBJECTIVE
Iron deficiency anaemia is a nutritional disorder prevalent among large population groups globally. Adolescent girls, pregnant women, and children constitute the most vulnerable. This study aimed at determining the effect of 10% *Telfaira occidentalis* leaf supplementation on some haematological parameters and tissue iron stores of female mice before and after gestation.

MATERIALS AND METHODS
Thirty (30) female mice were grouped into three (3) of ten (1sulphate each, group 1 served as normal control and were maintained on rat chow, group 2 were maintained on rat chow, and received daily 6.5mg/kg ferrous sulphate orally, and group 3 were maintained on rat chow supplementation with 10% *T. occidentalis*. Treatment was for 14 days and water was given *ad libitum*. Weight was assessed weekly, and five mice were sacrificed from each group. The remnant in each group were mated with three male mice each, observation was closely done, and pregnant mice were isolated until parturition. Dams (3) from each group were sacrificed after parturition. Blood samples, liver and brain tissues were collected. Concentration of some haematological parameters and iron concentration in harvested tissues were determined using standard protocols.

RESULTS AND DISCUSSIONS
There was a decrease in weights of mice in group 3 (20.22) when compared to group 2 (22.75) and group 1 (22.07). However the changes were not significant (p). Haematological parameters (white blood cell count (WBC), red blood cell count (RBC), haematocrits (HCT), haemoglobin concentration (HGB), mean corpuscular volume (MCV), mean corpuscular haemoglobin concentration (MCHC) before gestation increased in the *T. occidentalis* and ferrous sulphate treated groups when compared to the normal control group. The increase in the haematological parameters except in WBC were higher in group 3 when compared to group 2, although the changes where not significant ($p>0.05$). Also there were significant ($p<0.05$) decreases in the haematological parameters after parturition compared to before gestation. This decrease was higher in group 2 and group 1 when compared to group 3. The mice in *T. occidentalis* supplemented diet group and ferrous sulphate group had a significant ($p<0.05$) increase in brain and liver iron concentrations compared to those in normal control group. Also, the iron concentration in the tissues increased significantly ($p>0.05$) in all groups after parturition when compared to before gestation. The increase in iron concentration was higher in group 2 when compared to group 3.

CONCLUSIONAND RECOMMENDATION
This study has shown that prenatal *T. occidentalis* leaf supplementation at 10% increased haematological

parameters, and tissue iron stores significantly ($p<0.05$), but did not prevent significant decreases in haematological parameters after parturition.

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OI17

The effect of methanolic extract of *Ocimum gratisimum* leaves on insulin resistance and GLUT-4 gene expression in Monosodium glutamate induced obese Rats

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KEYWORDS: Glucose, Monosodium glutamate, Obesity, *Ocimum gratisimum*

BACKGROUND AND OBJECTIVES:

Obesity is a complex chronic global disease affecting people worldwide across all ages, sexes, ethnicities and nationalities, and it is the fifth leading cause of mortality globally. Obesity is accompanied by remodeling of the adipocyte, insulin resistance and type 2 diabetes. The present study aim to determine the effect of methanolic extract of *Ocimum gratisimum* leaves on insulin resistance and GLUT-4 gene expression in MSG induced obese Rats.

MATERIALS AND METHOD:

Thirty male Wistar rats weighing between 100 to 150 g were used for the study. Animals were divided into five groups of six animals each namely; Normal control (NC) rats, Obese control (DC) rats, Obese rats treated with *Ocimum gratissimum* (OG) 100 mg/kg B.W (OG-100), Obese rats treated with OG 200 mg/kg B.W (OG-200), Obese rats treated with orlistat 50 mg/kg B.W (OR-50). Obesity was induced by oral administration of 8 mg/g monosodium glutamate (MSG) for 7 days. All animals were treated with respective doses orally for one week while NC and DC groups were administered with vehicle only.

RESULTS

The results obtained shows significant ($P<0.05$) increase in weight of obese rats treated with methanolic extract of *Ocimum gratissimum* leaves. After one week of treatment with the extract, the weight, non fasting blood glucose (NFBG) and HOMA-IR level of the rats decreased significantly ($P<0.05$) when compared to obese control rats. In addition, the level of serum insulin was increased in all groups and GLUT-4 gene expression in OG-200 group only when compared to obese control group.

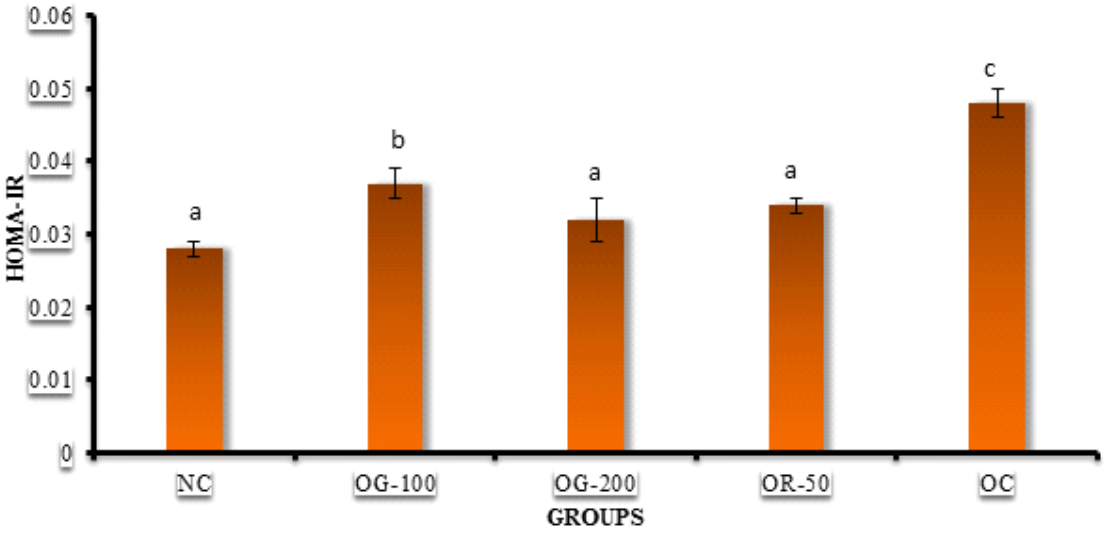

Figure 1: Effect of methanolic extract of *Ocimum gratissimum* leaves on insulin resistance level of MSG induced obese rats. The results are expressed as the mean ± SE. Different alphabets indicate significant difference (Tukey's-HSD multiple range *post hoc* test, P<0.05).NC= normal control rats, OG-100= obese rats treated with 100 mg/kg b.w methanolic extract of *Ocimum gratissimum*, OG-200= obese rats treated with 200 mg/kg b.w methanolic extract of *Ocimum gratissimum* , OR-50=obese rats treated with 50 mg/kg b.w orlistat, OC= obese control.

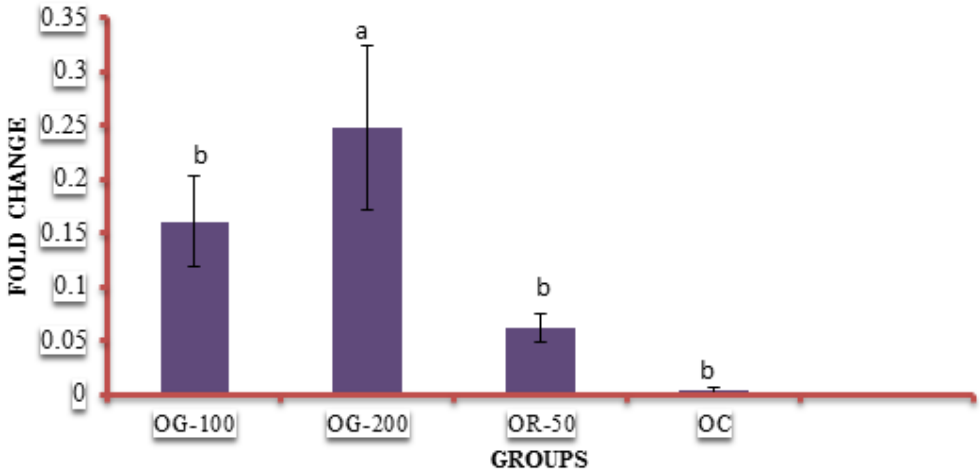

Figure 2: Effect of methanolic extract of *Ocimum gratissimum* leaves on GLUT-4 relative gene expression of MSG induced obese rats. The results are expressed as the mean ± SE. Different alphabets indicate significant difference (Tukey's-HSD multiple range *post hoc* test, P<0.05). OG-100= obese rats treated with 100 mg/kg b.w methanolic extract of *Ocimum gratissimum*, OG-200= obese rats treated with 200 mg/kg b.w methanolic extract of *Ocimum gratissimum* , OR-50=obese rats treated with 50 mg/kg b.w orlistat, OC= obese control.

DISCUSSION

Throughout the past few years, many medications have been introduced and approved by the United States Food and Drug Administration (FDA) for the treatment of obesity. However, most of them have subsequently been withdrawn due to various serious adverse effects [2]. *Ocimum gratissimum* can be a potent anti obesity

medication due to its numerous therapeutic effects. The methanolic leaves extract of the plant has the therapeutic potential of reducing the body weight within short period of one week, this drastic decrease can be due to the ability of the plant to reduce the level of inflammation [1] and also increase the level of insulin which inhibit hormone sensitive lipase and denovo synthesis of cholesterol by the liver, these results to low insulin resistance and increased expression of GLUT-4 gene. The hypoglycemic potency of OG leaves extract has been attributed to some basic phytochemical constituents present in the plant which include saponins, tannins, flavonoids, phenol, glycosides and steroid glucosides [3].

CONCLUSION

In conclusion, the use of methanolic extract of *Ocimum gratissimum* leaves can be a significant therapy in the treatment of obesity due to its significant hypoglycemic and anti hyperlipidemic properties obtained after treatment in MSG induced obese rats.

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OI18

Anthropometric and Biochemical Profile of Renal Patients attending Nephrology Clinic at Federal Medical Centre, Idi-Aba, Abeokuta, Ogun State.

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KEYWORDS: Renal disease, Anthropometry, Biochemical profile, Abeokuta Nigeria

BACKGROUND AND OBJECTIVE:

The kidney play vital roles in the body such as fluid and electrolyte balance, waste removal and regulate blood pressure. The rise in aging population, diabetes, hypertension and obesity; renal diseases have been identified to pose an increasing burden on public healthcare (1). This study was designed to assess the anthropometric and biochemical profile of renal patients attending nephrology clinic at Federal Medical Centre, Abeokuta, Ogun State.

MATERIALS AND METHODS:

A descriptive, cross-sectional study design was employed. A total of 50 renal patients were purposively selected. Informed consent was sought from the respondents and ethical clearance was obtained from the hospital ethical board. Biochemical and anthropometric assessments followed standard procedures, data collected were compared with recommended standards. Data was analyzed using SPSS version 25.

RESULTS AND DISCUSSION:

Results on the biochemical profile of renal patients revealed that a good number of the patients had altered serum chloride (40.0%), urea (34.0%), creatinine (54.0%), and sodium (64.0%) levels. This study also reported a low obesity and diabetes prevalence but a high prevalence of hypertension (58.0%) and isolated systolic hypertension (66.0%) amongst renal patients. Evidence of hypertension being implicated in renal patients is well documented (2,3).

CONCLUSION AND RECOMMENDATION

Altered biochemical profile and high hypertension prevalence was reported in renal patients. Therefore, intensification of care practices and advocacies to enable renal patients adopt/adhere to recommended dietary, lifestyle, drugs and other modifications will help stabilize these altered biochemical indices and elevated blood pressure.

Table 1: Biochemical Profile of respondents (N =50)

Variables	Low		Normal		High	
	Freq.	%	Freq.	%	Freq.	%
Bicarbonate	9	18.0	41	82.0	-	-
Potassium	22	44.0	25	50.0	3	6.0
Chloride	14	28.0	30	60.0	6	12.0
Urea	17	34.0	33	66.0	-	-
Creatinine	5	10.0	23	46.0	22	44.0
Sodium	25	50.0	18	36.0	7	14.0

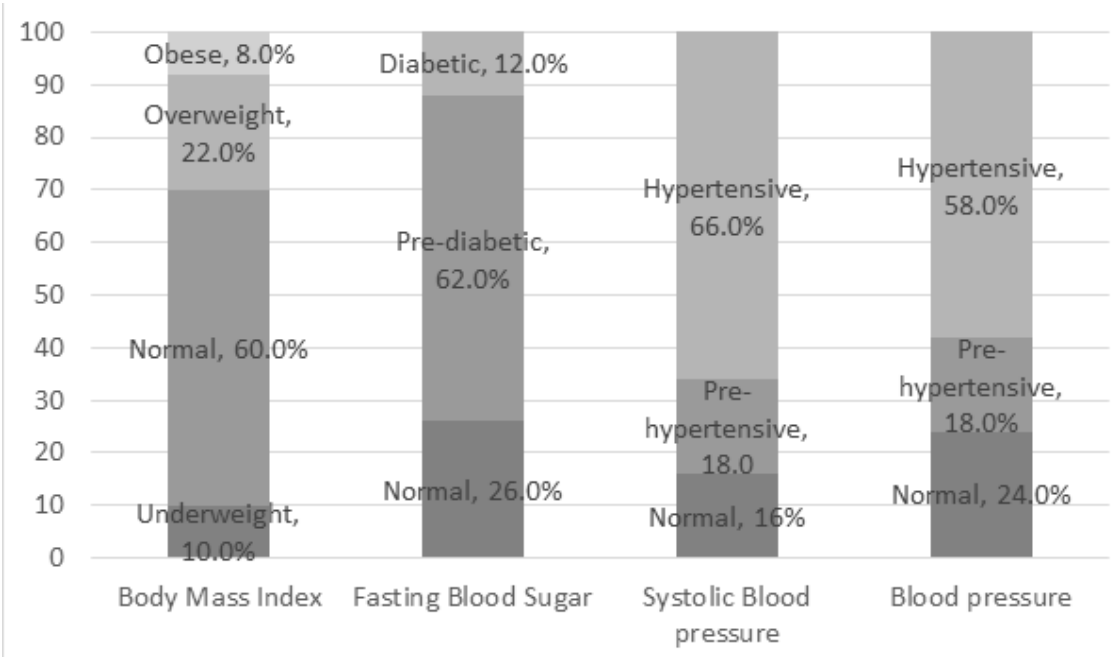

Fig 1. Prevalence of Obesity, Diabetes and Hypertension in Renal Patients (N=50)

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OI5

Effect of Leaching cassava mash in water on the Glycemic Index of *Garri*

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Key Words: Effect, Leaching, Cassava, Glycemic Index, *Garri*

Background and objectives

Garri is a fine, fermented and roasted coarse, granular flour of varying texture produced from cassava (*Manihot esculenta* Crantz) tubers. It is a cheap and good source of vigorous energy. Its ability to store well and ease of preparation as a convenience food are responsible for its tremendous popularity amongst the city dwellers both in Nigeria and other West African countries (1, 2). Starch and fibre are the major components of carbohydrate contained in *garri* with low protein content and some essential vitamins[3]. The high fibre content of *garri,* which is mostly insoluble fibre makes it very filling, and good in reducing the likelihood of bowel diseases. The consumption of foods exhibiting a high Glycemic Index is associated with the development of diseases such as type 2 diabetes and increase risk of cardiovascular diseases and obesity (4). The need for increasing food choices of the diabetic patients necessitated this study on the effect of leaching on the glycemic (GI) of *garri*.

Materials and Method

The experimental design was adopted using two cassava varieties: a local variety known as *Nwaocha* 'Land Raise' and an improved variety TMS 30575 developed by the International Institute of Tropical Agriculture (IITA), each cassava variety used was processed into eight samples. The volume of water (VOW) used for leaching was graded into four levels and samples coded based on the treatment thus: 10.0 liters ($F_{48}L_{10.00}$), 5.0 liters ($F_{48}L_{5.00}$), 2.50 liters ($F_{48}L_{2.50}$) and 1.25 liters ($F_{48}L_{1.25}$) for local and improved varieties. The quantity of cassava mash leached at a time was one kilogram (1kg) and fermented for 48 hours. Eight other samples were processed for the study to check the effect of leaching and fermentation. Seven normoglycemic adult volunteers were used to determine the GI of the food samples. Data generated were subjected to one-way analysis of variance (ANOVA) and students't-test procedure of statistical assessment was used to check for

differences of treatment in the cassava varieties. Mean values were further separated using fisher's least significant difference (LSD) and significant was accepted at $P < 0.05$.

Results and Discussion

The result shows that sample $F_{48}L_{10.00}$ of local and improved varieties had the least value (43.08±10.61 & 39.31±5.85), respectively. This could be attributed to the effect of leaching with the highest (10.0 liters) volume of water (VOW). The result further shows that the GI of both varieties were not significantly different ($P< 0.05$) but the local variety had apparent higher GI than the improved variety. The difference observed in samples $F_{48}L_{1.25}$ (51.54±8.89 & 50.36±22.86) and sample $F_0L_{1.25}$ (54.80±12.32 & 51.79±21.73) of both varieties leached with the same VOW (1.25L) could be attributed to the effect of fermentation. All the *garri* obtained from cassava mash fermented for 48 hours had GI values with the classification of low GI foods (with values lower than 55). Leaching of cassava mash in water significantly reduced the components of starch and sugar (carbohydrate) and subsequent increase in the fibrous material left in the mash and led to the production of low GI *garri*.

Conclusion and Recommendation

Among the *garri* samples in this study, those leached with 5 liters and 10 liters of VOW had significantly lower GI. This implies that leaching may have more significant effect on the GI of *garri* as the VOW used for leaching increases and that of fermentation would further reduce the GI *garri*. It is therefore recommended that *garri* should be leached and the fermentation period prolonged to reduce the GI of *garri* for the purpose of consumption by target groups such as the diabetic patients.

Table 4.27: Glycemic Index (GI) of *garri* samples from local and improved cassava varieties containing 50g available carbohydrates:

Treatment	Local variety	Improve variety	*P-value(0.05)*	Remarks
$F_0L_{0.00}$	$69.50±10.96^{b}$	$61.17±11.14^{b}$	0.317	NS
$F_{24}L_{0.00}$	$58.22±13.37^{c}$	$53.13±14.51^{bc}$	0.664	NS
$F_0L_{1.25}$	$54.80±12.32^{cd}$	$51.79±21.73^{bc}$	0.816	NS
$F_{48}L_{0.00}$	$53.70±10.96^{cde}$	$51.28±22.15^{bc}$	0.902	NS
$F_{48}L_{1.25}$	$51.54±8.89^{cde}$	$50.36±22.86^{bc}$	0.800	NS
$F_{48}L_{2.50}$	$48.41±13.37^{cde}$	$46.71±14.57^{bc}$	0.755	NS
$F_{48}L_{5.00}$	$46.50±8.13^{de}$	$43.47±16.02^{cd}$	0.507	NS
$F_{48}L_{10.00}$	$43.08±10.61^{e}$	$39.31±5.85^{d}$	0.185	NS
WB	100^{a}	100^{a}		
LSD	11.1	17.2		

Keys:

CAM = Cassava mash, WB = white bread (Reference food), LSD =Least significant difference, VOW = Volume of Water

$F_{48}L_{10.00}$ = Leached 10L VOW /1kg CAM, fermented 48h, $F_{48}L_{5.00}$= Leached 5L VOW /1kg CAM, fermented 48h,

$F_{48}L_{2.50}$= Leached 2.50L VOW /1kg CAM, fermented 48h, $F_{48}L_{1.25}$= Leached 1.25L VOW /1kg CAM, fermentation 48h

$F_{48}L_{0.00}$ = Not leached, fermented 48h, $F_{24}L_{0.00}$ = Not leached, fermentation 24h

$F_0L_{0.00}$ = Not leached, not fermented, $F_0L_{1.25}$ = Leached 1.25L VOW, not fermented

Different superscripts along a column represent significant differences of the same attribute as a result of difference in treatment.

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PI19

Minerals Composition of Four Mango Fruits Consumed in Enugu State

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Keywords: *Mango, minerals,*

Background:

Mango fruit (*Mangifera indica*) is a delicious juicy drupe, commonly consumed in Nigeria. It is commonly consumed in West Africa as whole fruits when in season or as juices by technology. Although there have been studies on nutrient composition of mango but there is lack of scientific data on the micronutrient and phytochemical composition of varieties of mango fruit based on average portion size. This study determined the micronutrient and phytochemical composition in a portion size of four mango varieties; Sweet mango (SM), Haden mango (HM), German mango (GM) and Alphonso mango (AM).

Objectives:

This study determined someminerals composition of four mango fruits consumed in Nsukka, Enugu state.

Methodology:

Samples of four mango varieties (Opioro, Alphonso, Haden, and Sweet) were randomly selected from different markets in Nsukka, Enugu state, Nigeria. Seven ripe mangoes from each variety were randomly selected, washed and weighed. The edible portions were separated, homogenized and subjected to chemical analysis to determine the micronutrient and phytochemical content using standard methods. The weight of each variety was standardized to derive the mean weight and used to calculate the average composition in a portion. Descriptive statistics (mean and standard deviation) was used to present the data obtained while analysis of variance (ANOVA) was used to compare the means and turkey HSD test was used to separate the means. Significance level was accepted at $p<0.05$.

Results:
The average weight of the four mango varieties are 124.14g for GM, 121.71g for AM, 192g for HM and 91.14g for SM. The calcium content per portion was statistically similar ($p>0.05$) in Opioro (113.41 mg), Alphonso (130.05 mg) and Sweet (146.1 mg) mangoes. The magnesium content of Opioro mango was significantly ($p<0.05$) least (0.67 mg) in standardized portion. The zinc content of Opioro and Alphonso was not significantly different ($p>0.05$) in standardized portion. The iodine content was comparable ($p>0.05$) but iron and phosphorous content significantly ($p<0.05$) differed across the samples per standardized portion size. Sweet mango had the highest content of iron, magnesium, phosphorous and potassium per 100g edible portion.

Conclusion:
This study shows the micronutrient and phytochemical composition of different mango varieties per portion size, which is vital in dietary counseling and portion size control.

OI20

Glycaemic Response of Jollof Rice made from Four Rice Varieties Consumed in Nigeria

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Background:
Rice is one of the commonest staple food consumed in Nigeria. Different rice varieties are eaten in Nigeria. Some of these rice varieties are imported while some are locally produced in Nigeria. The imported long grain variety is usually what is used by many homes and during occasions. However, importation of rice is banned in Nigeria to encourage local production in recent times. Imported rice analysed in this study was basmati rice which is common Indian rice varieties sold in malls and supermarkets in Nigeria. Basmati rice is seen as rice for the rich persons in Nigeria because it is expensive. Sometimes, those suffering from diabetes and persons desiring to reduce weight who are rich as well tend to use it instead of the local rice consumed in Nigeria. The common local rice consumed in Nigeria is commonly called Adani or Abakaliki rice which is a short grain and produced in Ebony State where the name was derived. Although the rice is cultivated in other parts of Nigeria. Another brown short grain variety mostly consumed in south western Nigeria in the variety used in cooking "ofada rice". Different persons have different notions about the glycaemic response of these rice varieties but the opinions are mostly based on individual experience and not from empirical studies.

Objective:
The study assessed the glycaemic index [GI] and glycaemic load [GL] of jollof rice made from four rice varieties (long grain imported rice, basmati rice, white short grain Adani rice and brown short grain ofada rice).

Methodology:
The different varieties of rice were obtained from Ogige main market, Nsukka and Shoprite mall Enugu, both in Enugu state, Nigeria. The cooking of all the rice varieties was standardized into jollof rice by adapting and modifying five online jollof rice recipes. The available carbohydrate content of the jollof rice dishes as consumed was determined using phenol-sulfuric acid method[1]. Glycaemic response was determined by standard method with 12 subjects for each sample[2]. The reference meal was 50g of anhydrous glucose. The GL was categorized as low, moderate or high, if it had respectively the lowest or equal to 10, 11 - 19, or greater than or equal to 20 while the GI values was classified as high (> 70), intermediate [medium] (>55 – < 70) and low (< 55)[3]. IBM SPSS statistics for windows version 22 was used to analyze the data obtained from the study. Descriptive statistics (mean and standard deviation) was used to present the data obtained. Analysis of variance (ANOVA) was used to compare the means while turkey honestly significant difference (HSD) was used for post-hoc analysis. A p-value < 0.05 was considered significant.

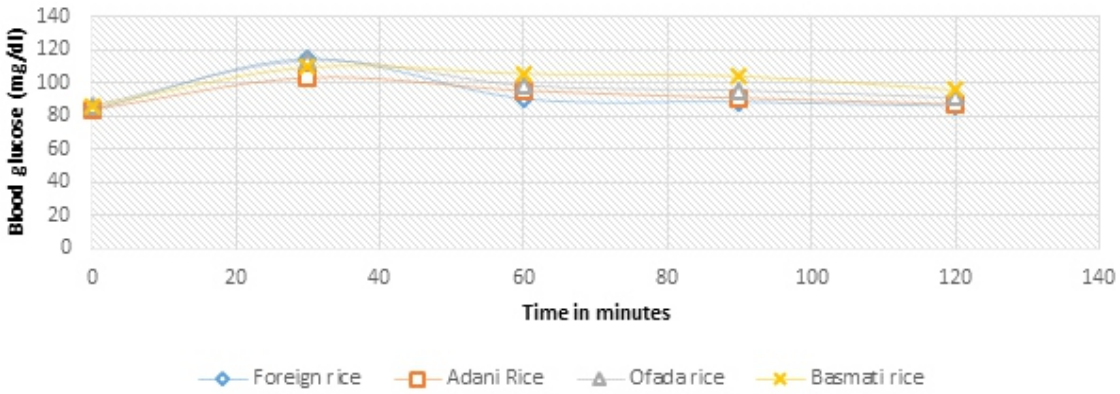
Results:
There was no significant difference ($p>0.05$) existing within the samples in the available carbohydrate content. The available carbohydrate ranged from 15.95g/100g to 16.25g/100g (Table 1). The quantity of jollof rice that will supply 50g of available carbohydrate were 313g for imported rice, 307g for Adani rice, 313.5g for Ofada rice and 308g for Basmati rice. All the jollof rice varieties had low GI and GL respectively (Table 1 and Figure 1). Adani and ofada rice had the least GI and GL respectively.

Table 1: The available carbohydrate content, glycaemic index, and glycaemic load of four jollof rice varieties consumed in Nigeria

Variety of Jollof Rice	Available Carbohydrate (g/100g)	Glycaemic Index (GI) (n=14)	GI Class	Glycaemic Load (GL) (n=14)	GL Class
Foreign rice	$15.96^{a} \pm 0.41$	27	low	4.33	low
Adani rice	$16.25^{a} \pm 0.28$	16	low	2.57	low
Ofada rice	$15.95^{a} \pm 0.12$	21	low	3.40	low
Basmati rice	$16.19^{a} \pm 0.36$	41	low	6.65	low

Mean ± standard deviation of triplicate determination. Means on the same column with different superscripts are significantly different at $p<0.05$.

Figure 1: Glycaemic response curve of four jollof rice varieties consumed in Nigeria



Discussion:

Rice is a good source of carbohydrate which is usually avoided by individuals suffering from diabetes mellitus, however, when oil and other ingredients are mixed with rice during cooking, it affects the glycaemic response as seen in this study. It has been reported that several factors could affect the glycaemic response of food which include the fat content, type of carbohydrate, fibre content, the cooking or food processing and anti-nutrients in foods[3-4]. Adani rice showed the lowest rise in blood glucose at 30 minutes while foreign rice showed the lowest rise in rise in blood glucose response at 60,90 and 120 minutes. However, Basmati rice had the highest increment of blood glucose response at 60, 90 and 120 minutes. Thus, this disproves the belief that locally cultivated Nigerian rice varieties are higher in carbohydrates than their counterpart imported varieties especially basmati rice. It is important to note that it is not all low GI or GL foods are low in fat or healthy to eat[2-4].

Conclusion:

The study concluded that jollof rice based on the four rice varieties had low GI and GL therefore, it could be recommended for persons with diabetes considering portion size control.

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OJ1

Knowledge of Obesity on Reproductive Health Outcomes of young Female Adults (19-35years) in Owo Local Government Area of Ondo State, Nigeria

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Keywords: Obesity, reproductive Health, cancer, infertility, young female adult

Introduction

The menace of obesity among women remains one of the challenges facing the 21st century Nutritionist and health care providers because of the danger obesity pose in the female lives most especially within their reproductive age. Curbing the global obesity epidemic among women of reproductive age require evidence-based multi-sectorial, multidisciplinary and culturally relevant approach in setting appropriate health intervention programs (1). Assessment of knowledge of women on the risk factors and health implications of obesity is crucial to the success of such program intervention (2). The probability of an obese individual to lose weight or maintain a healthy weight may depend greatly on what he or she has heard or knows about the complication of the condition. Many researchers have reported the various prevalence of obesity and overweight among different age groups including women of reproductive age in Nigeria but there is limited information on the knowledge of Obesity on Reproductive Health Outcomes. Hence, the need to investigate the knowledge of Obesity on Reproductive Health Outcomes of young Female Adults (19-35years) in Owo Local Government Area of Ondo State, Nigeria

Materials and Method

Study design

The study was a descriptive cross-sectional in design. The study population consisted of 500 healthy young female adults aged 19-35 in Owo local government area of Ondo State.

Data collection

A Modified version of the questions used was adopted from that developed by Eden *et al,* (3) on knowledge obesity and health implications of obesity. Nine (9) reproductive implications of obesity were listed for respondents to identify and each health outcome of obesity was assigned with a point. Knowledge score of health implication was assessed on a 9-point scale and scored as Low (≤3), average (≥4≥6) and high (≥7≥9).

Anthropometric measurements

Anthropometric measurements of height and weight were taken using Standiometer and weight scale (HANSON model) in line with the WHO standard and BMI calculated (4).

Statistical analysis

Statistical analysis was performed using the statistical package for social science (SPSS version 20). Descriptive statistics such as frequencies, percentages, mean and standard deviation were used to analyze data. In all cases, a probability of (<0.05) were taken to indicates the level of significance

Results

Knowledge score of perceived health consequences of obesity

Majority of subjects (62.2%) had average knowledge HI of which 38.4% of them was from the urban centre of the study area. Only 5.0% of the participants had a high knowledge of health implication of obesity. Low knowledge was also accounted for, about 33% of the subjects. Table (1)

Table 1b: Knowledge score of perceived health consequences of obesity

Score point	Indication	Urban (%)	Rural (%)	Total (%)
≤ 3 point	Low knowledge	95(19.0)	69(13.8)	164(32.8)
≥4≤6point	Average knowledge	191(38.4)	120(24.0)	311(62.2)
≥7≤9point	High knowledge	14(2.8)	11(2.2)	25(5.0)

Anthropometric parameters of the Respondents

The mean height and weight of the participants in this present study (table 5) were found to be 1.605 $\pm$ 0.055 and 59.195$\pm$ 8.7670 respectively. There was no significant difference between the height of the rural and urban participants at ($p<0.05$) but, a significant difference was observed in their body weight. Only (4.4%) of the study population were underweight, two-third (73%) were within the healthful BMI range while about (18.6%) of the participants were found to be overweight. However, 4% were battling with obesity. Urban participants were more obese than their rural counterpart, just like the rural participants were less underweight

Table 2a: Anthropometric parameters of the Respondents

Variables	Urban	Rural	Total	P-value
Height (m)	1.607 $\pm$ 0.0579	1.605 $\pm$ 0.055	1.606$\pm$ 0.0565	0.139
Weight(kg)	58.52 $\pm$9.5537	59.87 $\pm$ 7.982	59.195$\pm$ 8.7679	0.002*
BMI(kgm^{-2})	22.658 $\pm$ 3.50	23.248 $\pm$ 2.80	22.953$\pm$ 3.15	0.001*
body mass index (kgm^{-2})				
Under weight (<18.5kgm^{-2})	18(3.6)	4(0.8)	22(4.4)	0.003*
Normal (18.5 – 24.99)	219(48.3)	146(29.2)	365(73.0)	
Overweight (25- 29.99)	46(9.2)	47(9.4)	93(18.6)	
Obesity grade 1 (30 – 34.99)	17(3.4)	3(0.6)	20(4.0)	
Total				

*significant ($P<0.05$)

Knowledge of health implication of obesity on anthropometric status

Parameters	Body mass index				
KOHI score	**Underweight**	**Normal**	**Overweight**	**Obesity**	**Total**
Low Knowledge	7(1.4)	122(24.4)	27(5.2)	8(1.6)	164(32.8)
Moderate Knowledge	15(3.0)	222(44.4)	64(12.8)	10(2 .0)	311(62.2)
High Knowledge	0(0.0)	21(4.2)	(0.4)	2(0.4)	25(5.0)

X^2 6.164; P= 0.405; KOHI- Knowledge of Health Implication score

Discussion and Conclusion

Despite the high literacy observed in this study, it doesn't translate to health literacy among the respondents; this study observed a low and moderate knowledge score of health implications of obesity among the respondent's couple with knowledge deficit as per what causes obesity**.** Low life expectancy, Miscarriage and Cesarean section were the most identified perceived reproductive health outcome. Hospitals and media (radio/television) was the most responsible source of information about obesity. The prevalence of general obesity among the subjects was lower than Overweight. Medical and community- based health educator should take advantage of the opportunity to educate their patients and women of reproductive age on BMI and the risk of obesity on reproductive outcomes.

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PJ2

Prevalence of Obesity among Adult Resident in Bida, Niger State

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Background and objectives:

Chronic diseases, often referred to as non-communicable diseases (NCDs), usually emerge in middle age after long exposure to an unhealthy lifestyle such as consumption of refined foods and lack of regular physical activity. Obesity has occurred in parallel with the globalization of food systems and the expansion of

trade and foreign direct investment. This study determined the prevalence of obesity among adult in Bida LGA Niger State.

Materials and Methods:

The study was carried out in Bida LGA of Niger State which has a population of 185,553 (NPC, 2006). A total of 111 females and 99 males were randomly selected from all the 14 wards in Bida LGA of Niger State. A cross - sectional study was used while the purposive sampling technique was used to select the LGA. Systematic random sampling was to select eligible respondents in the 4 wards. Data was collected using a semi - structured questionnaire consisting of socio-economic and demographic information, dietary intake and anthropometric measurement (BMI and waist circumference). Weight and height were determined according to standard anthropometric methods and values obtained were compared to the BMI standard ranges.

An un-quantified food frequency questionnaire (FFQ) was used to collect dietary information from the subjects.

Results and Discussion:

Data was collected from total of 210 adults aged 20 – 60 years. Majority of the respondents were married (90.5%), followed by the divorced (4.3%) and singles (2.5%). Females were 52.9% while males 47.1% about 54.8% of the respondent were between the age of 30 – 39, 23.8% were between the age of 40 – 49 while 16.2% and 5.2% of 20 – 29 and > 49 respectively 45.2% of the respondent have attended tertiary education while 7.1% has information education. The body mass index (BMI) was distributed into six (6) group namely, underweight, normal, overweight, class 1 obesity, class 2 obesity, class 3 obesity accord to the WHO reference standard for BMI for age. The distribution of BMI should that 38(18.1%) of the adults within the age of 30 – 39 years were overweight with the highest frequency seen in adult male (10.5%). The BMI of an adult in Bida by age and sex distribution shows that, adult between the age of 30 – 39 years while according to the sex distribution, the females are leading except for obesity class 3 as shown in table 1. Mean waist circumference for women was 90.85cm and 94.26cm for men. Normal waist circumference is > 88ccm form women and >102cm for men. The distribution was divided into two groups; normal and above. From table 2, the distribution shows that about 64% of adults male is having a normal waist circumference while 71.7% of the females is having a waist circumference above the normal range. The dietary pattern of adult respondents shows that 25.7% and 14.2% consume fruits and vegetable at least once a day which is very low. Almost half (41%) of respondents consumed animal meat daily including about 12% also consuming egg daily.

Conclusion

Overweight and central obesity was noted to be generally high in Bida LGA, Niger State. These could be as a result of their unhealthy eating habit and inadequate physical activities which is associated with the developments of chronic disease among the adult population in Bida LGA.

Table 1: Nutritional Status of Adult Respondents in Bida LGA.

Classification	% Distribution of Nutritional Status		
	Male (n = 99)	Female (n = 111)	Total n = (210)
Underweight	1.0	3.6	2.4
Normal	19.2	19.8	19.5
Overweight	30.3	29.7	30.0
Class I obesity	26.3	27.0	27.6
Class II obesity	11.1	13.5	12.4
Class III obesity	10.1	6.3	8.1

Table 2: Waist Circumference Distribution by Sex among Adult Respondents in Bida LGA.

Waist Circumference Classification	Male (n = 99)	Female (n = 111)
Normal		
Men (≤102cm)	71	64
Woman (≤88cm)	40	36
Total	111	100
Above men (>102cm)	28	28.3
Women (>88cm)	71	71.7
Total	99	100

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PJ2

Development and Evaluation of Diet and Fitness Application for Nigerian Individuals

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Keywords: diet and fitness application, healthy eating.

BACKGROUND AND OBJECTIVES

Malnutrition is a growing global concern and Africa, especially Nigeria is not left out. Mobile diet and fitness applications have become increasingly popular in encouraging healthy eating habits, which in turn reduce the malnutrition curve (Tikkanen, 2017). However, in Nigeria, certain factors limit the use of this diet and fitness such as the absence of relatable Nigerian foods, inability to speak with a professional and inability to network with other users.

MATERIALS AND METHODS

This study looked at the benefits of diet and fitness applications in nutrition, some of which include: increased convenience on the user as they can access professional advice at their own time, improved accuracy among others. The application "NUTRIFIT, version 1.0" was developed and foods included were gotten from the Nigerian food composition table, along the food exchange list used in the University College

Hospital (UCH), Ibadan.

RESULTS AND DISCUSSION

The app was developed between January and June 2020 and was evaluated by 30 panelists in August 2020, the foods chosen in the application were based on the commonly consumed foods by Nigerians. To successfully use the app, new users were required to input demographic data such as age, height, weight, estimated activity level etc. to help calculate the estimated daily nutrient requirement of the user, also food intake, exercise daily, weekly or monthly were also required. To achieve this, the design specification for the application was done using Unified Modeling Language diagrams such as use case diagrams and sequence diagrams. This was then implemented using: Angular - a JavaScript framework. After the development of the NutriFit App, 30 participants were selected for the survey, to which 63.3% of the participants had used a diet/fitness app before, 36.7% had never used a diet/fitness app before. After the survey, 51.7% of the participants rated the app as well, 0.7% rated the app great, and 24.1% rated the app fair while 3.4% rated the very terrible. Furthermore, 93.3% of participants said the app meets the requirement of helping individuals stay healthy while 6.7% did not agree. Likewise, 96.7% said they would recommend the app to a family or friend but 3.3% said they would not. The reason behind the terrible ratings, and the respondents not going to recommend the application can be linked to the limited features presently available in the application, hence the suggestions of what to add to improve the usage and efficiency of the application.

CONCLUSION AND RECOMMENDATION

This study was able to understand the factors that enhance the use of these health applications as well as the limitations to be improved on. The results show that the app can gain traction in terms of its adoption given the fact that it is easy to operate the app than require a physical fitness trainee to monitor your nutrition and fitness activities. The app can be furthermore developed to contain more relatable Nigerian foods, and also provide self-services like gaming and networking with other users.

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OJ6

Assessment of Some Micronutrients in Commonly Consumed Native Soups among Nupe People of Niger State, Nigeria

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Keywords: Micronutrient, Native soup, Foods and Vitamins

BACKGROUND AND OBJECTIVES

Micronutrients are essential food nutrients that provide the body protection against diseases; hence are necessary for maintaining good health and growth [1,2]. Inadequate intake of micronutrients known as "hidden hunger" contributes to the increasing rates of illness and death from infectious diseases and disability such as mental impairment [3]. Nigerian soups are well-loved due to the simple method of preparation and delicious taste. Soups are very essential to Nigerian food recipes and good sources of micronutrients [4]. This study assessed the concentrations of some minerals and vitamins in commonly consumed native soups among Nupe people of Niger state, Nigeria.

MATERIALS AND METHODS:

A cross sectional survey was conducted to document the commonly consumed native soups among Nupe people residing in Bida and Lavun Local Government Area, Niger state using stratified sampling method. The ingredients for the recipes of six (6) commonly consumed soups were standardized in the laboratory, prepared and evaluated for some mineral and vitamin contents using standard procedures.

RESULTS AND DISCUSSION:

The result of mineral content of standardized native soup is presented in Table1. The calcium contents ranged from 0.027 – 0.042 mg/100g, both "eni emagi" and kuka had the highest value and "eni kpanmi" recorded the lowest content. Zinc concentration was between 0.016 – 0.051 mg/100g, "eni nungbere" had the highest while kpanmi soup recorded the lowest value. The iron concentration ranged from 0.017 – 0.041 mg/100g, "eni ezowa" recorded the highest content and kuka soup had the least value. Potassium ranged from 0.022 – 0.055 mg/100g and sodium contents was between 0.026 – 0.059 mg/100g. Both "eni emagi" and "eni ezowa" had the highest and lowest values for potassium and sodium concentration respectively.

Table 1: Mineral Compositions of Standardized Native Soups of Nupe People in Niger State (mg/100g).

Soups	Ca	Mg	Zn	Fe	Cu	K	Na
"Eni Emagi"	0.042±0.08^{a}	0.032±0.06^{a}	0.043±0.05^{bc}	0.022±0.05^{a}	0.022±0.04^{a}	0.022±0.01^{a}	0.026±0.02^{a}
"Eni Kuka"	0.042±0.13^{a}	0.037±0.06^{ab}	0.028±0.07^{ab}	0.017±0.07^{a}	0.028±0.07^{a}	0.033±0.01^{b}	0.031±0.04^{a}
"Eni Nungbere"	0.035±0.13^{a}	0.037±0.03^{ab}	0.051±0.05^{c}	0.019±0.03^{a}	0.027±0.00^{a}	0.036±0.06^{b}	0.039±0.02^{b}
"Eni Tsuku"	0.040±0.12^{a}	0.047±0.03^{b}	0.025±0.05^{a}	0.029±0.00^{b}	0.039±0.18^{a}	0.043±0.03^{c}	0.044±0.02^{b}
"Eni Kpanmi"	0.027±0.08^{a}	0.063±0.10^{c}	0.016±0.05^{a}	0.038±0.05^{c}	0.025±0.02^{a}	0.049±0.01^{d}	0.052±0.04^{c}
"Eni Ezowa"	0.035±0.27^{a}	0.093±0.12^{d}	0.021±0.17^{a}	0.041±0.03^{c}	0.026±0.09^{a}	0.055±0.02^{e}	0.059±0.04^{d}

Values are Mean ± S.D of triplicate determinations. Values with different superscripts down the column are significantly different ($p<0.05$).

Some of the minerals such as calcium, zinc, iron and potassium concentrations obtained in this study are lower than those reported in some Nigerian soups [5] therefore, large quantity of the vegetables need to be included during the preparation of the soups which might increase the availability of the mineral to be absorb by the body.

CONCLUSION: Nupe soups contain appreciable amount of minerals and vitamins which could help contribute to the recommended daily intake of the nutrient and also to Nigeria food composition data.

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OJ7

Proximate Composition and Acceptability of Cookies made from Tiger Nut Flour (*cyperus esculentus*).

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Keywords: Tiger Nut Flour, Proximate Composition, Acceptability, Cookies

Background:

Consumption of tiger nut is relatively popular in some societies and in the Egyptian herbal remedies as an anti-diabetic agent, also suitable for diabetic persons (1). It has been reported that tiger nut has a high dietary fiber content (2). The objective of this study is to analyze the proximate composition and acceptability of cookies made from tiger nut flour and wheat flour.

Materials and Methods:

The brown variety tiger-nuts tubers purchased from Mile 12, Lagos State, was weighed and sorted to remove dirt after which it was washed, dried and grinded using the hammer mill. The composite flour formula

where; TT1=100% refined wheat flour (Control), TT2=Cookies with 70 % tiger nut flour and 30% refined wheat flour, TT3=Cookies with 80 % tiger nut flour and 20% refined wheat flour, TT4=Cookies with 90 % tiger nut flour and 10% refined wheat flour and TT5=100% Tiger nut flour. The recipe of (3) method of cookie production was slightly modified and adopted, as ingredients used for baking process remained the same in all cookie samples. Samples of cookies were analyzed for moisture content, ash, crude protein, crude fat, crude fiber and total carbohydrate following the Association of Analytical Chemist (AOAC) procedures (4).

Result:

Table 1 shows the proximate analysis of the cookie samples revealing the significant decrease ($p<0.05$) of the moisture and protein content as incorporation of tiger nut flour increased. Sample TT2 had the lowest crude fat while the crude fibre was statistically significant as the tiger nut flour increased

Table 1: Proximate composition of cookies produced from Tiger nut-wheat composite flour

Sample	Moisture (%)	Crude protein (%)	Crude fat (%)	Crude fiber (%)	Total ash (%)	Total carbo hydrate (%)	Energy value (kcal)
TT1	4.94 ± 0.12^{a}	11.11 ± 0.06^{d}	8.13 ± 0.15^{a}	1.04 ± 0.02^{a}	1.30 ± 0.08^{a}	73.50 ± 0.44^{d}	411.55 ± 0.16^{a}
TT2	4.32 ± 0.11^{b}	8.29 ± 0.05^{c}	13.83 ± 0.04^{b}	4.02 ± 0.08^{b}	2.12 ± 0.04^{b}	67.45 ± 0.09^{c}	435.15 ± 0.26^{b}
TT3	4.23 ± 0.05^{b}	8.12 ± 0.04^{b}	14.76 ± 0.16^{c}	4.56 ± 0.04^{c}	2.35 ± 0.03^{c}	66.00 ± 0.13^{b}	438.16 ± 1.24^{c}
TT4	3.98 ± 0.04^{a}	7.88 ± 0.05^{a}	15.22 ± 0.23^{d}	4.78 ± 0.04^{d}	2.44 ± 0.04^{cd}	65.72 ± 0.06^{b}	440.82 ± 1.36^{cd}
TT5	3.91 ± 0.08^{a}	7.87 ± 0.02^{a}	15.50 ± 0.11^{d}	5.25 ± 0.03^{e}	2.50 ± 0.02^{d}	64.99 ± 0.01^{a}	442.20 ± 1.44^{d}

Mean values with different superscript within the same column are significantly different.

Table 2: Sensory properties of cookies produced from Tiger nut-wheat composite flour

Sample Code	Appearance	Taste	Mouth feel	Texture	Overall Acceptability
TT1	$7.48^{a} \pm 0.71$	$4.40^{b} \pm 0.87$	$4.92^{b} \pm 0.76$	$5.32^{b} \pm 0.75$	$4.68^{b} \pm 0.85$
TT2	$7.12^{a} \pm 0.78$	$7.60^{b} \pm 0.96$	$7.64^{c} \pm 0.91$	$7.80^{c} \pm 0.50$	$8.12^{b} \pm 0.78$
TT3	$7.12^{b} \pm 1.20$	$7.48^{b} \pm 0.96$	$7.68^{b} \pm 0.99$	$6.48^{b} \pm 1.48$	$7.40^{b} \pm 0.71$
TT4	$4.84^{b} \pm 0.69$	$7.28^{a} \pm 1.24$	$7.64^{a} \pm 1.04$	$6.56^{a} \pm 1.19$	$7.32^{a} \pm 0.69$
TT5	$4.64^{b} \pm 0.81$	$8.06^{b} \pm 0.86$	$8.20^{b} \pm 0.76$	$7.28^{c} \pm 0.73$	$7.40^{c} \pm 0.71$

According to table 2, sample TT2 had the highest overall acceptability (Mean ± SD=8.12 ± 0.78)

Conclusion:

Inclusion of tiger nut flour at various levels resulted in notable increase in the fiber content. The cookies have the potential as a functional food especially for diabetic and obese patients considering the high fiber content.

Recommendation:

Considering the acceptability level of sample TT2, increased utilization and awareness of tiger nut flour should be encouraged in baking industries for pastries production.

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OJ8

Effects of Socio-demographic Characteristics on the Consumption Pattern of Snacks among Young Adults in Bauchi State.

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Keywords: Snack, Consumption pattern, Young adults

BACKGROUND AND OBJECTIVES

A snack is a portion of food, often smaller than a regular meal, generally eaten between meals (1). Good nutrition and adequate diet combined with regular physical activities is a cornerstone of good health.Many students do not know the nutritional value of snacks they eat.Many students avoid certain foods because of personal dislike, social and cultural pressure, peer group influence, religion etc,(2).Snacking is commonly associated with undesirable health outcomes and consequently snacking is regarded as a contributing factor in the development of overweight and obesity (3).Thus, this study aimed to investigate effects of socio-demographic characteristics on the consumption pattern of snacks among young adults

MATERIALS AND METHODS

The study was a cross-sectional descriptive survey conducted among undergraduates of the Federal Polytechnic Bauchi. The simple random sampling method was employed, to select 200 students using questionnaire to elicit socio-demographic characteristics, meal & snacking patterns information and frequently of consumption .Data were analyzed using statistical package for social sciences (SPSS) version 21.0.

RESULTS AND DISCUSSION

Table 1: Socio-demographic characteristics of the respondents

Variable	Frequency (n)	Percentage (%)
Gender		
Male	114	57.0
Female	86	43.0
Age		
16 – 20	60	30.0
20 – 24	44	22.0
24 – 28	94	47.0
>28	2	1.0
Monthly Allowances (Naira)		
1,000 – 5,000	56	28.0
5,001 – 10,000	82	41.0
10,001 – 15,000	58	29.0
>15,000	4	2.0
Body Mass Index (BMI-kg/m^2)		
Underweight	30	15.0
Healthy weight	124	62.0
Overweight	20	10.0
Obese	26	13.0
Total	**200**	**100.0**

Table 2:Body mass index(BMI) classification and Meal &Snacking patterndistribution

	MEAL AND SNACKING PATTERN						
BMI	**3M+3S**	**3M+2S**	**3M+1S**	**3M**	**2M+2,3 S**	**2M+0,1 S**	**TOTAL**
UNDERWEIGHT	4	0	20	6	0	4	34
	2%	0%	10%	3%	0%	2%	17%
HEALTHYWEIGHT	12	22	44	24	6	10	118
	6%	11%	22%	12%	3%	5%	59%
OVERWEIGHT	4	8	4	6	2	2	26
	2%	4%	2%	3%	1%	1%	13%
OBESE	6	6	0	2	6	2	22
	3%	3%	0%	1%	3%	1%	11%
TOTAL	**26(13%)**	**36(18%)**	**68(34%)**	**38(19%)**	**14(7%)**	**18(9%)**	**200(100%)**

M= Meals and S= Snack

Table1 shows that the age of respondents, 57.0% were male while 43.0% were female. The highest monthly allowance was (41.0%) while 28.0%.reported receiving between N1,000 and N 5,000.For (BMI) - underweight(15.0%), healthy weight (62.0%), overweight (10%) and obese (13.0).Table 2 shows that 10% of the respondents practiced meal and snacking pattern (3M + 1S) were underweight, this is similar to a previous study by (3), that reported (3M+1S) in 14.2% of the respondents, while 5% of respondents with 2M + 0,1S obtained healthy weight.However,3% of respondents practiced meal and snacking pattern (3M + 3S), were obese.

CONCLUSION AND RECOMMENDATION

The consumption of snack foods among undergraduates is increasingly becoming an emerging trend. The body weight status based on the meal and snacking patterns was not consistent. Snack foods choices remain a concern, and hence vegetables and fruits as snacks should be encouraged. Therefore educational campaigns and behavioral change communication on healthy nutrition and lifestyles among young people are hereby advocated.

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OJ9

A Community-Based Survey of Hypertension and Associated Risk Factors among Rural Adults in Abia State, Nigeria

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Keywords: Hypertension, risk factors, adults, rural.

BACKGROUND AND OBJECTIVES:

Hypertension is considered a *"silent killer"* and growing public health problem in developing countries (1). Evidence on the burden of hypertension in community dwelling adults in Nigeria is limited. This study therefore aimed to determine the prevalence and identify factors associated with hypertension among rural dwellers in Abia State, Nigeria.

MATERIALS AND METHODS:

The study was a community-based cross-sectional survey conducted among 429 apparently healthy rural adults aged 20 years and above using cluster sampling technique. Information on sociodemographic characteristics was obtained using a validated questionnaire. Dietary intake was assessed using 24-hour recall, blood pressure and anthropometric measurements were carried out following standard procedures. Hypertension was defined as systolic blood pressure (SBP) equal or greater than 140mmHg and/or diastolic BP (DBP) equal or greater than 90mmHg. Logistic regression analysis was used to assess risk factors associated with hypertension.

RESULTS AND DISCUSSION:

The prevalence of hypertension was 51.0% (58.1% in males and 43.1% in females). This was higher in

comparison to the 36.6% found among adult urban residents of Ile-Ife, in Osun state, Nigeria (2). Hypertension was significantly associated with age, gender, marital status and BMI. Older age (>40 years) (OR=1.96; 95% CL1.03 to 3.72; p<0.04) and overweight/obesity (OR=2.55; 95% CL1.50 to 4.34; p<0.001) were associated with higher odds of having hypertension. Females had lower odds of having hypertension compared to males (OR=0.32; 95% CI 0.20 to 0.52; p<0.001).

Figure 1. Blood pressure status of respondents.

CONCLUSION AND RECOMMENDATION:

Hypertension prevalence is on the rise among rural adults. This confirms the growing concern that hypertension is a public health concern. It is therefore recommended that aggressive screening of adults for early hypertension be carried out in order to prevent the damaging consequences if left untreated. Educational programs aimed at maintaining normal arterial blood pressure should also be implemented by healthcare providers.

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OJ10

Prevalence of cardiovascular risk factors among adults in a rural Nigerian community

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Keywords: cardiovascular risk, obesity, hypertension, diabetes mellitus

BACKGROUND AND OBJECTİVES:
Cardiovascular risk factors has been found to be on the rise with advancing age. This study sought to assess the prevalence of cardiovascular risk factors among adults (≥ 50 years) in a rural Nigerian community.

MATERIALS AND METHODS:
This cross-sectional community-based study was carried out in Ede-Oballa, a rural community in Nsukka, Local Government Area, Enugu state using multi-stage random sampling technique to select 331 respondents. Structured questionnaire was used to obtain information on the respondents' socio-demography. Anthropometric measurements, blood pressure, fasting blood glucose and lipid profile was obtained using standard procedures. Statistical Product for Service Solution was used for data analysis. Chi-square was used to determine the relationship existing among variables at $p < 0.05$.

RESULTS AND DISCUSSION:
Cardiovascular risk factors such as overweight (38.7%), obesity (17.2%), abdominal obesity (32.9%), hypertension (35.0%), diabetes mellitus (45.5%), hypercholesterolemia (21.3%), hypertriglyceridemia (15.1%), high LDL (36.4%) and low HDL (42.4%) were seen among the respondents. This shows that the adults in Ede-Oballa were at risk of cardiovascular events.

Table 1: Socio-demographic information of the respondents

Variables		Male n(%)	Female n(%)	Total n(%)
Age (years)	50 -59	45 (32.6)	104 (53.9)	149 (45.0)
		93 (67.4)	89 (46.1)	182 (55.0)
	Total	**138 (100.0)**	**193 (100.0)**	**331 (100.0)**
Highest	None	23 (16.7)	34 (17.6)	57 (17.2)
educational	Primary education	63 (45.7)	100 (51.8)	163 (49.2)
level	Secondary education	30 (21.7)	36 (18.7)	66 (19.9)
attained	Tertiary education	22 (15.9)	23 (11.9)	45 (13.6)
	Total	**138 (100.0)**	**193 (100.0)**	**331 (100.0)**
Occupation	Unemployed	39 (28.3)	56 (29.0)	95 (28.7)
	Civil servant	22 (15.9)	21 (10.9)	43 (13.0)
	Self-employed	57 (41.3)	102 (52.8)	159 (48.0)
	Retiree	20 (14.5)	14 (7.3)	34 (10.3)
	Total	**138 (100.0)**	**193 (100.0)**	**331 (100.0)**
Monthly	< 18, 000	69 (50.0)	123 (63.7)	192 (58.0)
income (₦)	18, 000 - < 50,000	48 (34.8)	56 (29.0)	104 (31.4)
	≥ 50, 000	21 (15.2)	14 (7.3)	35 (10.6)
	Total	**138 (100.0)**	**193 (100.0)**	**331 (100.0)**

Table 2: Prevalence of cardiovascular risk factors among the respondents

Variables	Male n(%)	Female n(%)	Total n(%)
Overweight	49 (35.5)	79 (40.9)	128 (38.7)
Obesity	15 (10.9)	42 (21.8)	57 (17.2)
Abdominal obesity	23 (16.7)	86 (44.6)	109 (32.9)
Hypertension	48 (34.8)	68 (35.2)	116 (35.0)
Diabetes mellitus	7 (46.7)	8 (44.4)	15 (45.5)
Hypercholesterolemia	2 (13.4)	5 (27.8)	7 (21.3)
Hypertriglyceridemia	1 (6.7)	4 (22.3)	4 (15.1)
High LDL	4 (26.7)	8 (44.4))	12 (36.4)
Low HDL	6 (40.0)	8 (44.4)	14 (42.4)

CONCLUSION AND RECOMMENDATİON(S):

Cardiovascular risk factors were highly prevalent among the respondents. Periodic screening for detection and treatment of cardiovascular diseases is recommended.

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OJ11

Prevalence of cardiovascular disease risk factors among adults in rural southeast Nigeria

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Keywords: Obesity, hypertension, impaired fasting plasma glucose, lipid profile

BACKGROUND AND OBJECTIVE:

Cardiovascular diseases (CVDs) are number one cause of death globally with more people (over 50%) dying annually from CVDs than from any other cause [1]. This study assessed the prevalence and clustering of CVD risk factors among rural Nigerian adults.

MATERIALS AND METHODS:

This cross sectional study involved 517 apparently healthy adults 20-60 year-old selected through multistage sampling technique from three rural communities in Enugu State. Obesity was determined

through body mass index and or waist circumference, blood pressure with Omron automatic sphygmomanometer, fasting plasma glucose with Accu-Chek glucometer and lipid profile with Acon *Mission*® cholesterol meter. Descriptive statistics (Chi square) of SPSS version 21 was used in data analysis; results were presented in frequencies and percentages.

RESULTS AND DISCUSSION:

Higher prevalence of obesity (89.6 vs 76.7%%), hypertension (66.5 vs 45.4%), IFPG (97.0 vs 82.4%), triglyceride (12.1 vs 11.8%), HDL-c (54.5 vs 41.2%), LDL-c (78.8 vs 64.7%), total cholesterol (66.7 vs 47.1%) and clustering of > 3 risk factors (63.6 vs 23.5%) affected 40-60 than 20-39 year-olds. These findings are higher than previously reported [2, 3]. Those aged 20-39 years had significantly (P<0.05) higher prevalence of one, two and three risk factors clustered together while four and five clusters were preponderant among those aged 40-60 years (Figure 1). The findings suggest an impending cardiovascular tragedy among the 40-60 year-olds if uncontrolled.

Table 1: Age-wise prevalence of CVD risk factors

Variables	20-39 N(%)	40 - 60 N(%)	χ^2(P value)
Any form of obesity*			
Yes	191(76.7)	225(89.6)	14.962(0.000)***
No	58(23.3)	26(10.4)	
Hypertension (mmHg)			
[illegible]	113(45.4)	167(66.5)	22.698(0.000)***
Absent (SBP <130 and/or DBP <85)	136(54.6)	84(33.5)	
Fasting plasma glucose (mg/dL)			
Normal (<100)	3(17.6)	1(3.0)	1.518(0.218)
High (≥ 100)	14(82.4)	32(97.0)	
Triglyceride (mg/dL)			
Normal (<150)	15(88.2)	29(87.9)	0.001(0.971)
High (≥150)	2(11.8)	4(12.1)	
High density lipoprotein (mg/dL)			
Normal (≥40 mg/dL in male and ≥50 mg/dL in	10(58.8)	15(45.5)	0.802(0.370)
Low (<40 mg/dL in male and <50 mg/dL in female)	7(41.2)	18(54.5)	
Low density lipoprotein (mg/dL)			
Normal (<100)	6(35.3)	7(21.2)	1.156(0.282)
High (≥100)	11(64.7)	26(78.8)	
Total cholesterol (mg/dL)			
Normal (<200)	10(58.8)	11(33.3)	2.993(0.084)
High (≥200)	7(41.2)	22(66.7)	
Clustering of CVD risk factors			
Clusters of ≤3 risk factors	13(76.5)	12(36.4)	7.219(0.007)**
Clusters of >3 risk factors	4(23.5)	21(63.6)	

*Obesity by body mass index (≥25.0 kg/m^2) and/or waist circumference (≥94 cm in males and ≥80 cm in females). **P<0.01 ***P<0.001

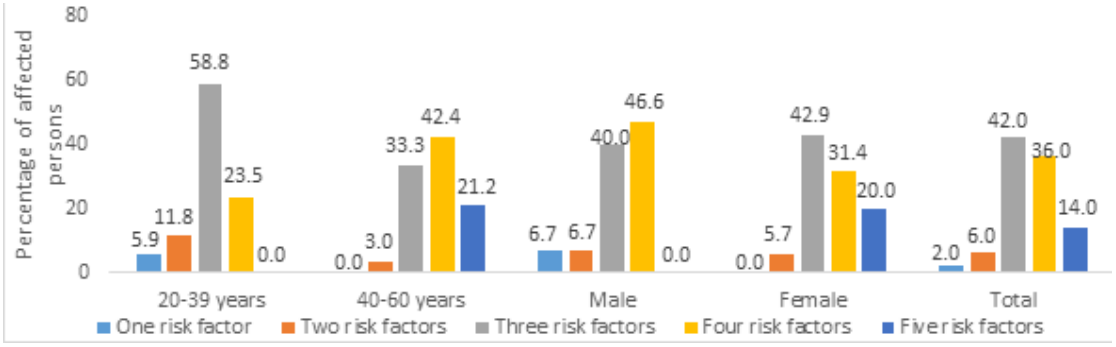

Fig 1: Prevalence of clusters of cardiovascular risk factors according to age and gender

CONCLUSION/RECOMMENDATION:

There is high prevalence of CVD risk factors among the participants with the 40-60 year-olds more disadvantaged. This calls for ameliorative strategies to curtail future cardiovascular catastrophe.

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PJ12

Food Consumption score, Dietary habits and Anthropometric Indices of Market Traders in Owo Township, Ondo State, Nigeria

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Keywords; Food Consumption score, Dietary habits, central obesity, market traders

Introduction

Market traders are a vital part of the agricultural and economic value chain that bridges the gap between farmers or manufacturers and the consumers. This occupation involves transacting business from a spot and traders are either doing their job standing in one position or sitting down all day. This habit surely have a

great influence on energy expenditure and may be a great contribution to sedentary lifestyle because some of these traders do not get to exercise their bodies all day long (1), their food consumption habits may lead to poor and even dangerous lifestyle. Their markets activities may influence lifestyle which may eventually affect their nutritional status (2). These conditions increase their risk of developing obesity and other non-communicable diseases. A study of traders across various parts of Nigeria revealed prevalence of obesity to be 16.3% in Ibadan (3), 12.3% in Lagos (4) and 28.1% in Sokoto (5). There is, however, dearth of information on abdominal obesity and food consumption patterns of market traders in Ondo state. This study investigated the food consumption patterns and anthropometric indices of market traders in Owo township of Ondo State

Study design

The study was a descriptive cross-sectional in design. The study population consisted of 205 apparently healthy market traders in Owo local government area of Ondo State.

Data collection

Questionnaire

A pre-tested, semi – structured questionnaire was use elicit information on dietary habits and a version of the questionnaire developed by World Food Programme (1996) was use in the calculated of food consumption score of the respondents.

Anthropometric measurements

Anthropometric measurements of height, waist and hip measurement were taken using Standiometer and tape rule (butterfly model) in line with the WHO standard and Waist Hip Ratio (WHR), Waist Circumference (WC) and Waist to Height Ratio (WHtR) were all calculated to determine the nutritional status of the respondents.

Statistical analysis

Statistical analysis was performed using the statistical package for social science (SPSS version 20). Descriptive statistics such as frequencies, percentages, mean and standard deviation were used to analyze data. In all cases, a probability of (<0.05) were taken to indicates level of significance

Results

Dietary Habit/Intake of the respondent

The dietary habits respondent is presented in Table 3 which revealed that majority of the respondents take breakfast (52.7%) between 6-8am. About 61.0% of the respondents skip meals while 32.2% does not skip meals and 6.8% does not respond to the question. The meals skipped by respondents are breakfast (30.2%), lunch (36.6%), dinner (1.0%) and no response 32.7%. Most of the respondents take their dinner between 6-8pm (62.0%). 90.7% eat vegetables and 7.3 does not eat vegetables. About 59.5% which represent more than half of the respondents take vegetables between 2-3days in a week and the least recorded was 6days (0.5%). Furthermore 39.5% eat fruits everyday while 32.2% does not eat fruits every day and 27.8% does not respond to the question. Majority of the respondent about (83.4%) think that fruits and vegetables are good to eat.

Food consumption score for the respondents

Food consumption score for the respondents is represented in (table 1). Majority of the respondent of about 56.1% meet the acceptable food consumption score, 34.1% were at the borderline and 9.8% had poor food consumption score

Anthropometric Status of the Respondents

Anthropometric status of the respondents has revealed by waist- hip ratio shows that about (61.5%) of the entire study population had normal WHR while (38.5%) were found to have a high fat accumulation.

Likewise the prevalence of central obesity was higher among female respondents about (23.1%) compare to their males counterpart (3.0%) and it was statistically significant ($p<0.05$), while (73.2%) of the participants had normal waist circumference according to WHO classification. Judging with waist to height ratio, a total of 52.2% had normal waist to height ratio while 47.8% were obese as at the collection of this data.

Conclusion

This study found a high prevalence of central obesity and high or acceptable food consumption score level among the market traders in Owo. This was more pronounced among the female marketers than their male counterparts. Skipping habit and late eating of dinner was very high among the traders most especially breakfast. There was inadequate intake of fruits among the market traders suggesting that many of the market traders are suffering from micronutrient deficiency which is associated with various chronic diseases.

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Table 1: Dietary habits of the respondents

Variables	Frequency (N=205)	Percentage (%)
Time of breakfast		
6-8am	108	52.7
9-10am	87	42.4
11-12am	10	4.8
Total	**205**	**100.0**
Do you skip meals?		
Yes	125	61.0
No	80	39.0
Total	**205**	**100.0**
If yes, type of meal do you skip		
Breakfast	82	65.6
Lunch	23	18.4
Dinner	10	8.0
Total	**125**	**100.0**
Do you eat vegetables?		
Yes	186	90.7
No	19	9.3
Total	**205**	**100.0**
Do you take fruits every day?		
Yes	139	67.7
No	66	32.2
Total	**250**	**100.0**
Food consumption score	**Frequency (N=205)**	**Percentage (%)**
Poor	20	9.8
Borderline	70	34.1
Acceptable	115	56.1
Total	**205**	**100.0**

Table 2 : Anthropometric Status of the Respondents

Anthropometrics	Male	Female	Total (n=205)	X^2	P value
parameters	**(n=91) (%)**	**N=114) (%)**	**(%)**		
Waist circumference					
<88cm<102cm(Normal)	79(38.5)	61(29.7)	140(68.3)	221.76	0.002*
>88cm >102cm(Excess)	12(5.8)	53(25.9)	65(31.7)		
Waist-Hip Ratio					
<0.85<0.90(Normal)	78(38.1)	48(23.4)	126(61.5)	222.62	0.003*
≥0.85≥0.90 (Excess)	13(6.3)	66(32.2)	79(38.5)		
Waist-Height Ratio					
<0.5 (Normal)	63(30.7)	44(21.5)	107(52.2)	18.771	0.001*
≥0.5 (Excess	28(13.7)	64(31.2)	92(44.8)		

*Significant at P<0.05)

PJ13

The Acceptability of Lesser-known indigenous leafy Vegetables (Cocoyam and Sweet potato leaves) in soups of households in South-East, Nigeria

Mberekpe, P. B

Key words: Acceptability, Indigenous, Lesser-known, Leafy vegetable.

Background and objectives of the Study

Vegetables are less sweet and more savory; and served as part of a main dish which includes other parts of the plant such as stem, roots, flower bud and leaves. Otitoju, et al(1.) and Okon, e (2) defined leafy vegetables as the fleshy and edible portion of herbaceous plants, which can be eaten raw and cooked with other condiments as soup. Olugbenga, et al. (3) opined that, indigenous leafy vegetables are highly recommended because their consumption gives diversity to daily food intake, by adding flavor and zest to the diet. Some indigenous vegetables are lesser-known (unpopular or not well known), and some are known. The lesser-known vegetables also include cocoyam *(colocasaiea esculenta)* and sweet potato (*ipomoea batatas L)* leaves. The main objective of this study was to assess the acceptability of lesser-known indigenous leafy vegetables (cocoyam and sweet potato leaves) in the soups of households in South Eastern Nigeria for the purpose of popularizing their consumption for their nutritional and economic benefits.

Materials and Methods:

Fourteen 14 soups were made for the acceptability assessment. The total recipe used for the 14 soups include: 6 cups of ground melon seeds, 2 cups of ground ogbono seeds, 6 cooked whole chicken, 30 medium sized dried fishes, 10 medium sized boiled stock fish, 2kg boiled goat meat, 6kg of boiled offal, 6kg of beef, 3kg of kanda, palm oil, 2kg of palm fruits, ground crayfish, 14 medium sized onions, fermented locust bean for seasoning, 2kg of cocoyam leaves, 2kg of sweet potato leaves, 250g of fluted pumpkin leaves, 250g of waterleaf, 6 tablespoons of Achi, 6 tablespoons of offor, 2kg of okro, fresh pepper and salt to taste. These soup ingredients were used to make 14 soups and were coded as follows: chicken melon soup made with cocoyam leaf (MECLS); chicken melon soup with sweet potato leaf (MEPLS); Goat meat ogbono

soup made with cocoyam leaf (OGCLS); Goat meat ogbono soup with sweet potato leaf (OGPLS); chicken banga soup (palm fruits) with cocoyam leaf (BGCLS); chicken banga soup with sweet potato leaf (BGPLS); chicken vegetable soup with cocoyam leaf (VECLS); chicken vegetable soup with sweet potato leaf (VEPLS); beef okro soup with cocoyam leaf (CLOKS); beef okro soup with sweet potato leaf (PLOKS); beef achi soup with cocoyam leaf (ACCLS); beef achi soup with sweet potato leaf (ACPLS); beef offor soup with cocoyam leaf (OFCLS) and beef offor soup with sweet potato leaf (OFPLS). The soup samples were presented warm for evaluation at room temperature. The soup samples were properly coded for 20 judges in clean odourless and tasteless containers. Each judge was given a bottle of swan water and carrot sticks to rinse his or her mouth after tasting a soup sample to avoid interference with the taste of the proceeding soup samples. The evaluation was conducted in the Home Economics departmental Foods and Nutrition laboratory of the faculty of Vocational and Technical Education, University of Nigeria, Nsukka.

Result and Discussion:

The 14 soup samples were all rated very high in all the attributes such as taste, flavor, colour, appearance, texture and general acceptability. General acceptability means ($\bar{x}$) are as follows: OGCLS (7.59), CLOKS (7.60), MECLS (7.70), VECLS (7.90), BGCLS (7.90), ACCLS (7.70), OFCLS (7.50), OGPLS (7.60), PLOKS (7.70), MEPLS (7.80), VEPLS (7.95), BGPLS (7.60), ACPLS (7.70) and OFPLS (7.80).

Conclusion and Recommendation:

The study concluded that, cocoyam and sweet potato leaves could be of immense benefit if included in household meals as it would help in ameliorating micronutrient deficiencies, degenerative diseases etc and these could actually serve as alternatives to the commonly utilized vegetables. It was recommended among others that, the consumption of cocoyam and sweet potato leaves should be encouraged by all families in the country; Cocoyam and Sweet potato leaves should be sold in the open markets same way as the popular vegetables are sold.

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PJ14

Beverage Consumption, Risk of Dental Caries, and Nutritional Status of Adolescents in Ido Local Government, Ibadan, Nigeria

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Keywords: Dental Caries, Beverage consumption, Nutritional status, Adolescent,

Background

Beverages may contribute to the human water requirement. Despite the reality that all refreshments contain water, water itself is not classed as a refreshment. The word beverage, on the other hand, has continuously been characterized as not alluding to water. Moreover, it has been reported that these beverages are within the best ten contributing nourishments (Sayed, 2019).

Dental caries is the demineralization of the enamel part of the tooth caused by acid-forming bacteria in the mouth. Dental caries remains a major public health burden for babies, pre-school, primary school-going children, and young people in both the created and less created nations –(Musinguzi et al., 2019). The major oral infection in children is dental caries, frequently related to the consumption of free sugars in supplementary nourishments and behavioral characteristics such as nighttime bottle nourishing (Souza et al., 2014). Adolescents dietary pattern is characterized by intake of non-nutrient dense foods and beverages that can increase the risk of dental caries (Okoye & Ekwueme, 2011).

Material and Methods

The study design was a cross-sectional survey in a semi-urban community, Ido local government, Ibadan, Nigeria. The study participants consisted of 200 systematically selected students from two randomly selected government secondary schools. Ethical clearance was obtained from the local ethics committee and informed consent from the students and their guardians. Relevant information on socio-demographic variables, tooth cleaning method, snacking habit, and previous dental visits were obtained and a validated beverage recall questionnaire was used to assess beverage intake. Data were analyzed using SPSS version 22 and presented below.

Results

Table 1: Table 1 shows the mean beverage intake stratified by sex. It affirms that females drank more water (1255.47cl) than the males (1133.23cl). Water was taken more than other beverages. It further shows that the females had more beverage intake than the males.

Table 1: Mean beverage intake stratified by sex

Beverages (cl)	Males	Females
Water	1133.23±70.83	1255.47±83.53
Milk	87.32±14.56	108.19±16.71
Soft Drink	97.33±7.73	98.60±8.91
Fruit Juice	65.00±12.42	68.67±13.12
Vegetable Juice	3.90±2.52	5.47±2.5
Hot Beverage	61.12±8.94	77.85±12.9
sport & Energy drink	38.60±11.53	48.45±14.46
Alcoholic drink	29.97±7.6	37.94±9.51
herbal Drink	13.71±3.91	14.45±4.33
Total beverages	1530.21±89.82	1714.44±96.48

Table 2: Table 2 shows the risk of dental caries of the respondents. Many of the respondents (67.7%) are at low risk of having dental caries while a few (5.0%) are at high risk of having dental caries with damage missing filled teeth (DMFT) mean ±1.55.

Table 2: Decayed, missing, and filled teeth status

	Frequency	Percentage	DMFT MEAN
Very low	136	67.7	1.55
Low	28	13.9	
Moderate	27	13.4	
High	10	5.0	
Total	201	100	

Table 3:Correlation of each total beverage with the dentition score

	Total water	Milk drink	Soft drink	Fruit Drink	Vegetable Drink	Hot beverage	Energy drink	Alcoholic Drink	Herbal Drink	Total beverages	DMFT score
Total Water	1	0.19**	0.07	0.08	-0.09	0.02	-0.04	-0.11	-0.16*	0.85**	0.03
Milk drink		1	0.68**	0.38**	0.07	0.40**	0.33**	0.19**	0.29**	0.53**	-0.10
Soft Drink			1	0.29**	0.07	0.44**	0.36**	0.11	0.35**	0.37**	0.01
Fruit Drink				1	0.23**	0.42**	0.44**	0.25**	0.42**	0.45**	-0.05
Vegetable Drink					1	0.26**	0.17*	0.12	-0.01	0.07	-0.06
Hot beverage						1	0.36**	0.30**	0.33**	0.39**	-0.05
Energy drink							1	0.28**	0.40**	0.34**	-0.08
Alcoholic drink								1	0.39**	0.17*	-0.02
Herbal drink									1	0.18**	-0.04
Total beverages										1	-0.02
DMFT Score											1

** significant at p<0,01, *significant at p<0,05. DMFT: damage missing filled teeth

Conclusion

The study revealed that the respondents' risk of dental caries was low; however, there were untreated caries. Association was found between DMFT and some classes of beverage. Thus, beverage patterns have the potential to affect oral health .

Recommendation

The findings of this study could serve as a guide for planning adolescent oriented oral health promotion programmes. Additional research is needed to determine whether these nutrients have a direct role in the caries process.

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PJ15

Comparative Study on the Anthropometric Measurements, Physical Activity Level, and Prevalence of Non-Communicable Diseases among Bauchi and Gombe State University Staff, In North East.

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Background of the Study

Non-Communicable Diseases (NCDs) are group of diseases that are chronic in nature, not contagious but reduce the quality of life of the affected individuals and can also lead to death. In Nigeria, the common NCDs include cardiovascular disease, hypertension, diabetes and cancers. Many studies have documented the rising prevalence of NCDs among the general population in Nigeria. Hypertension is said to affect 25 to 48% of the adult population, while nearly 10% are diabetic, and the incidence of cancer is on the increase (Akinlua et. al., 2015). Recently, attention has focused on special populations, such as healthcare providers, civil servants and bankers, as they are thought to be among the relatively affluent in the community (Oladimeji et al., 2014).

Specific Objectives

1. The anthropometric measurement of the respondents.
2. The physical activity level of the respondents.
3. Prevalence of Nutritional related communicable disease.

Methodology

The study was cross sectional descriptive survey conducted at Bauchi State University and Gombe State University There are cultural similarities between Gombe and Bauchi in the people's language, occupational practices, festivals, dress and there is a high degree of ethnic interaction especially in marriage and economic activities. Some of the ethnic groups have joking relationships that exist between them, e.g. Fulani and Kanuri, etc. Samples of 250 staff were randomly selected from both Bauchi and Gombe State Universities. Information on anthropometric data, socio-demographic data, and physical activity level were obtained from the respondents with 250 structured questionnaires. The data obtained were analyzed with the use of Statistical Package for Social Sciences (SPSS) version 20 frequencies and descriptive statistics.

Result and Discussion

TABLE 1: Prevalence of Non-Communicable Disease and BMI Category of Respondents

	BSUG		GSU	
Variables	**Frequency**	**Percentage%**	**Frequency**	**Percentage%**
None	87	69	91	72.8
diabetes Mellitus	6	4.8	19	15.2
Hypertension	16	12.8	5	4.0
Cardiovascular Disease	1	.8	0	0
Obesity	5	4.0	3	2.4
Osteoporosis	10	8.0	7	5.6
Total	125	100	125	100
BMI category				
Underweight	4	3.2	14	11.2
Normal Weight	61	48.8	50	40.0
Overweight	36	28.8	29	23.2
Obese	24	19.2	32	25.6
Total	125	100	125	100

BSUG: Bauchi State University, GadauGSU: Gombe State Univeristy

The result from the table above showed that 4.8% and 15.2% from both BSUG and GSU have Diabetes mellitus, only 12.8% and 4.0% had hypertension, from both BSUG and GSU.Majority of the respondents 48.8%, 40.0% of BSUG and GSU had Normal body Mass Index, 28.8% and 23.2% of the respondents from both BSUG and GSU are overweight respectively.

TABLE 3: Physical Activity Level of the Respondents

	BSUG		GSU	
Variables	**Frequency**	**Percentage%**	**Frequency**	**Percentage%**
Insufficiently Active (<600 MET/week)	31	24.8	32	25.6
Moderately active (600-3000 MET/week)	48	38.4	50	40
Vigorously Active (>3000 MET/week)	46	36.8	43	34.4
Total	125	100	125	100

The above table represent the physical activity level of the respondents which shows 38.4% and 40% of the respondents at BSUG and GSU are moderately active, while 24.8% at BSUG and whereas 25.6% at GSU are also insufficiently active, 36.8% and 34.4 of the respondents engage in vigorous work in both BSUG and GSU respectively.

Conclusion/Recommendation

NCDs and their risk factors are induced upon by body mass index and physical activity. Regular physical activity, fitness, and exercise are critically important for the health and wellbeing of people of all ages.

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PJ16

Chemical Composition of *Hibiscus sabdariffa .L.* calyx Powder

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Keywords: Proximate, vitamins, minerals, phytochemicals, powder

BACKGROUND/OBJECTIVE:

Undernutrition is a major health challenge of the Nigerian populace impacting negatively on the general wellbeing of affected individuals. A major component is deficiencies in various micronutrients required by the body for effective functioning. Undernutrition in childhood causes poor growth, development and survival and is also a risk factor for overweight/obesity and non-communicable diseases in later life [1]. A study showed that micronutrient deficiencies relate to many chronic diseases, such as osteoporosis, cancer and cardiovascular diseases [2]. Development of micronutrient rich powder may help to overcome these diseases and promote health. The objective of this study was to produce Roselle calyx powder and evaluate its proximate, micronutrient and phytochemical compositions.

MATERIALS AND METHODS:

Roselle calyx (*Hibiscus sabdariffa .L.*) procured from a local market was further sundried to constant weight to increase its crispiness. It was milled into fine powder and further sieved using a muslin cloth (0.25 mm mesh) to obtain a smooth consistency and stored in an air tight container. Chemical analyses (proximate, minerals, vitamins, phytochemicals and anti-nutrients) were conducted using standard methods. Data were analysed with descriptive statistics of SPSS, version 21 and results presented in means and standard deviations.

RESULTS AND DISCUSSION:

Results showed that Roselle calyx powder contained 5.37% crude protein, 12.90% ash, 4.52% fibre, 2.38% crude fat, 8.16% moisture and 66.67% carbohydrate. Higher crude protein (8.31%) and fibre (11.53%) but lower ash (5.69%) have been reported [3]. Mineral content were zinc (4.09mg), iron (8.18mg), selenium (78.16mg) and calcium (684.53mg). Vitamin C (16.79mg) and beta carotene (0.12mg/20.0RE) were also present. The beverage contains alkaloid (3.60%), saponin (0.76%), anthocyanin (3.09%) and flavonoids (6.51%). Vitamin C and anthocyanin are indicators of the antioxidant capacity of the calyx and consumption of Roselle calyx beverage may yield the antioxidant associated health benefits which has been reported to be many [4].

Table 1: Proximate composition of Roselle calyx powder per 100 g

Variables (%)	Means	Standard deviations
Protein	5.37	0.06
Ash	12.90	0.15
Fibre	4.52	0.04
Fat	2.38	0.04
Moisture	8.16	0.01
Carbohydrate	66.67	0.07

Values are means ± standard deviations

Table 2: Micronutrient and phytochemical composition of the powder per 100 g

Variables	Means	Standard deviations
Minerals		
Zinc (mg)	4.09	0.04
Iron (mg)	8.18	0.05
Selenium(mg)	78.16	0.16
Calcium (mg)	684.53	0.83
Vitamins		
Beta carotene (mg/RE)	0.12/20.0	0.04
Vitamin C (mg)	16.79	0.08
Phytochemicals		
Alkaloid (mg)	3.60	0.08
Saponin (mg)	0.76	0.01
Anthocyanin (mg)	3.09	0.03
Flavonoid (mg)	6.51	0.08

Values are means ± standard deviations

CONCLUSION/RECOMMENDATION:

Roselle calyx natural powder has high nutritive value and therefore can be incorporated into foods as a food fortificant to prevent and control undernutrition.

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PJ17

Prevalence of Micronutrients Deficiency among the Under-five and Women of Child-Bearing Age in Northern Nigeria: Current Strategies put in Place to curb them.

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Key words: Micronutrients deficiencies, Nutritional anaemia, Food fortification, Nutrients supplementation

BACKGROUND AND OBJECTIVES

Micronutrient deficiencies constitute a global health issue especially among women and children jeopardizing national economy and prosperity of developing countries (1, 2 and 3). Study aimed to determine the prevalence of nutritional anaemia and Vitamiin A deficiency diseases among the under-five and women of child bearing age in northern Nigeria and the strategies put in place to curb them. Objectives included determining the prevalence of nutritional anaemia, Vitamin A deficiency and Iodine deficiency diseases with the consumption pattern of the target group and what intervention programs are put in place by various states to curb them.

MATERIALS AND METHOD

Study area, Design and Population

Northern Nigeria comprising of North east, North west and North central zones

A systematic review design which assessed the under five and women of child bearing age

Methods of data collection

Systematic approach was used to select data from studies of other researchers.

RESULTS AND DISCUSSION

Study revealed 28.5%, 21.7% and 33.1% of iron deficiency anaemia among under-five and 32%, 39.2% and 36.4% in women in NE, NW and NC respectively. VAD was 3% in NW, 3.6% in Kaduna, and 4.0% in Sokoto while 6.0% of under-five in NE (Maiduguri) with Kwashiorkor had VAD, while among the women it was 26.6%, 19%, 21%, 13.7% and 10% in the dry and moist savanna, rural, medium and urban sector. Iodine deficiency among the children was 8% and 15%, 10.6%, 10.6% and 15.5% in dry and moist savannah and rural, medium and urban sector respectively. 16%, 13% and 25.4% of mothers initiated breastfeeding within 1hour of delivery in NE, NW and NC. Only 14.3% of children were exclusively breastfed in NW agreeing with (3). Nutrition education and nutrients supplementation implemented by states to curb deficiencies.

Table 1: Micronutrients nutrients deficiencies and feeding pattern of Respondents

Parameters	Under Five Year %	Women of Child Bearing Age %
Iron Deficiency(by Zones)		
North East	28.5	32
North West	21.7	39.2
North Central	33.1	36.4
Sector		
Rural	23.4	21
Medium	25.1	13.7
Urban	22.2	10
Iodine Deficiency		
Dry savanna (Borno state)	8.0	22.2
Moist savanna (Kaduna state)	15.0	37.5
Breastfeeding 1hr of birth (Zones)		
North East	16.4	
North west	13	
North central	25.4	
Exclusive breast feeding		
Zones		
North East	23	
North West	14.3	
North Central	34.7	
Frq of fd consumption/dy		
Once daily		5.5
Twice daily		21.5
Thrice daily		55.8
>3 times daily		17.1

CONCLUSION AND RECOMMENDATION

Micronutrients deficiencies are still a threat in the northern region, need to enhance and monitor strategies put in place to curb them.

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OK1

COVID-19 Knowledge, Perception and Food Consumption Pattern of Adult Nigerians.

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KEYWORDS: COVID-19, Knowledge, Perception, Consumption frequency

BACKGROUND AND OBJECTIVES:

Coronavirus Disease 2019 also known as COVID-19 is a rapidly expanding pandemic. Up to the time this study was published, no antiviral treatment or vaccine has been explicitly recommended for COVID-19, therefore applying preventive measures to control COVID-19 infection is the most critical intervention. Human behavior is usually modelled as the demand for disease prevention, which is assumed responsive to risk perception and awareness (1). This study was designed to investigate the COVID-19 knowledge, risk perception and food consumption pattern of respondents living in Nigerian cities/towns.

MATERIALS AND METHODS:

This cross-sectional, web-based study employed a snowball sampling technique to recruit 701 adult Nigerians living in cities/towns of the country's six geopolitical zones during the COVID-19 pandemic by encouraging those sent the link to share with their contacts. The survey questionnaires assessed the COVID 19 knowledge/perception and consumption frequency of diverse foods/food groups. Data collected was extracted and analyzed using Excel version 2016 and IBM SPSS version 22 respectively.

RESULTS AND DISCUSSION:

Study findings revealed a preponderance of high COVID-19 knowledge (88.0%), high perception towards COVID-19 susceptibility (72.2%) and benefits (72.2%) of preventive behaviors. However, more than a quarter (25.8%) of the respondents had a high barrier perception towards COVID-19 prevention. Similarly, previous studies have reported a high COVID-19 related knowledge and perception (2,3). A high (>5days/week) mean consumption frequency of foods within the fats/oil, meat, staples and vegetable groups was observed in this study.

CONCLUSION AND RECOMMENDATION:

The respondents' level of COVID-19 knowledge and perception is highly commendable, but this did not translate in their diversity and frequency of food consumption. Hence, more awareness should be created on the role of an adequate diet in health and infectious disease prevention.

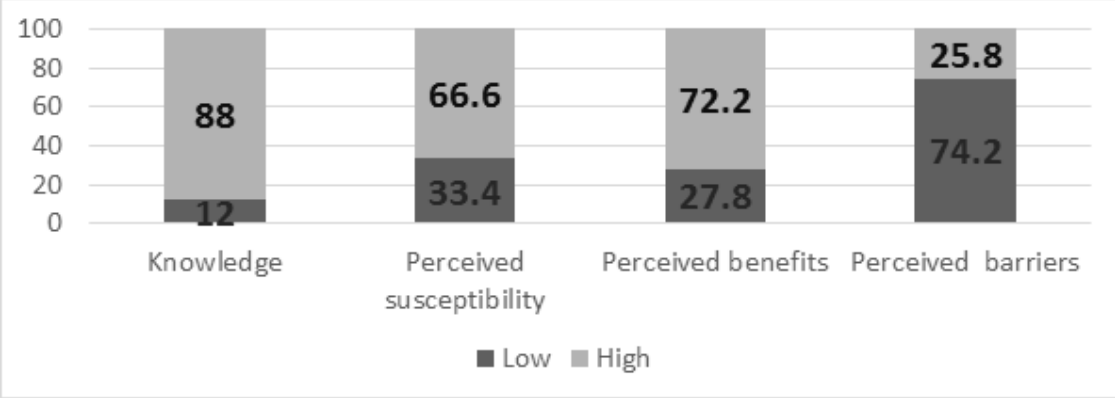

Fig 1. COVID-19 related knowledge and perception of respondents

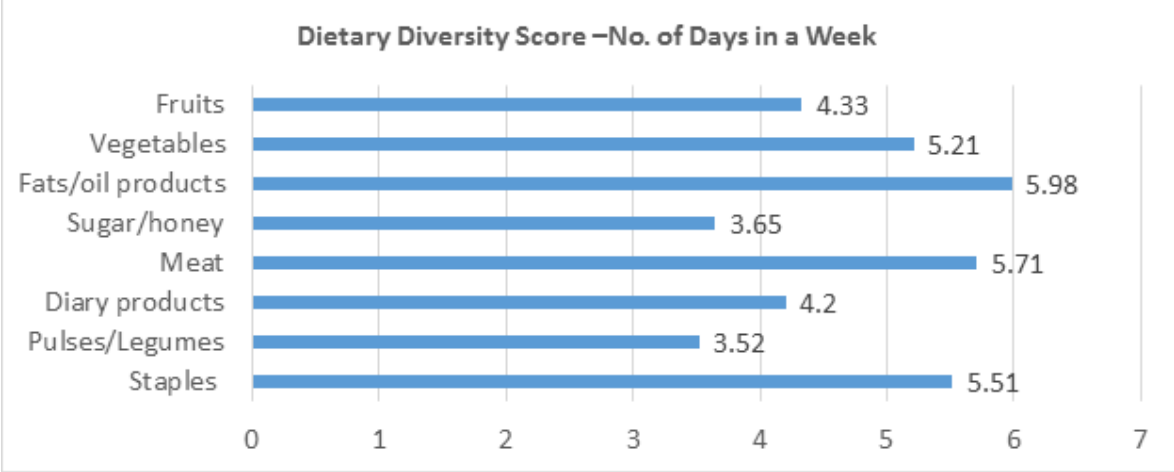

Fig 2. Weekly consumption frequency of diverse food groups

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OK2

COVID - 19 and Immunity- Can Consumer Knowledge and Perception about Herbs and Spices Play a Role?

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Keywords:COVID-19, Immunity, Knowledge, Herbs and Spices.

Background and Objectives
A novel coronavirus, SARS-CoV-2 was identified in December 2019, as the pathogen causing coronavirus disease (COVID-19) in Wuhan, China (1). In the wake of this pandemic, there has been a lot of interest in ways to strengthen one's immune system. Herbs and Spices are known as one of the most noteworthy ingredients for its indigenous flavour, nutritional value and medicinal properties. Thus, this study aimed to investigate the role-play of consumer's nutritional knowledge and perception about Herbs and Spices.

Materials and Methods
This research was conducted using E-questionnaire to elicit information from 100 respondents via different conservative WhatsApp group platforms in Nigeria. The collected data was analyzed using descriptive statistics such (frequency and percentage) via SPSS 19.0.

Results and Discussion
Table 1 revealed the most frequently used herbs and spices in households along with respondent's preference. The results showed that majority of the respondents consumed herbs and spices listed from serial number 1 to 8 while little above average consumed Moringa (57%) and Kolanut (51%) and fewer (29%) consumed cinnamon. The prevalence of herbs and spices usage in this present study was found to be similar to a previous study, which reported 79% usage (2). Table 2 shows the summary of respondent's knowledge and perception on the use of herbs and spices for boosting immunity. It was observed that little above average (52%) had good nutrition knowledge on the usage of herbs and spices for building a strong immunity while 41% had a fair knowledge and 7% had a poor knowledge.

All (100%) of the respondents had a positive perception towards the usage of herbs and spices.

Table 1: Most Frequently used Herbs and Spices in Households and Preference

S/N	Herbs and Spices	Respondents who		Total F (%)
		Consumed F (%)	Didn't Consume F (%)	
1	Ginger	89 (89.0)	11 (11.0)	100 (100.0)
2	Neem Leaves	83 (83.0)	17 (17.0)	100 (100.0)
3	Aloe Vera	78 (78.0)	22 (22.0)	100 (100.0)
4	Garlic	74 (74.0)	26 (26.0)	100 (100.0)
5	Mango Tree Barks	67 (67.0)	33 (33.0)	100 (100.0)
6	Bitter-Kola	61 (61.0)	39 (39.0)	100 (100.0)
7	Guava Tree Barks	63 (63.0)	37 (37.0)	100 (100.0)
8	Turmeric	57 (57.0)	43 (43.0)	100 (100.0)
9	Moringa	55 (55.0)	45 (45.0)	100 (100.0)
10	Kolanut	53 (53.0)	47 (47.0)	100 (100.0)
11	Lemon Grass	46 (46.0)	54 (54.0)	100 (100.0)
12	Tamarind	33 (33.0)	67 (67.0)	100 (100.0)
13	Clove	31 (31.0)	69 (69.0)	100 (100.0)
14	Cinnamon	28 (28.0)	72 (72.0)	100 (100.0)

Table 2:Summary of Respondents Knowledge and Perception towards the use of Herbs and Spices for Boosting Immunity

Knowledge Grade	Frequency	Percentage
Poor	7	7.0
Fair	41	41.0
Good	52	52.0
Total	100	100.0
Perception Grade		
Positive Perception	100	100.0
Negative Perception	0	0.0

Conclusion and Recommendation

The need for herbs and spices is steadily increasing as consumer's exhibit interest in it, for the betterment of their health; this might be borne out of social media and friends' information as consumers are skeptical about the actual cure of COVID-19. It is mandatory to create awareness among the consumers towards herbs/spices which are more advantageous, but discord on alarming trend of inappropriate use to the health system.

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PK3

Hepatitis B Awareness and Anthropometric Status of House Hold Heads and Literate Members of the Family (Case Study of Sabon Lugbe Community in FCT Abuja)

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Introduction:
Hepatitis B (HBV) infection is among the leading public health burden especially in developing countries (3). According to recent estimates, approximately 30% of the world's population that is, about 2 billion persons have serologic evidence of current or past HBV infection (4).This study was conducted to assess the level of Hepatitis B awareness and nutritional status of House Hold Heads and Literate Members of the Family (Case Study of Sabon Lugbe Community in FCT Abuja).

Methodology:
A total of 180 males and female respondents were selected from different households using systematic random sampling techniques. A structured questionnaire was used to obtain information on socio-demographic data, knowledge about Hepatitis B infection. Anthropometric measures of the respondents were taken using weight scale and height meter. Data were analyzed using Statistic Package for Social Sciences (SPSS version 16.0). Body mass index (BMI) was calculated from anthropometric data.

Results/Discussion:
The result from table 1 revealed that the mean weight and height of the respondents were 69.85±13.4 and 1.66±0.21 respectively. About 51% had normal BMI while 49% had different level of malnutrition. There was a significant difference between level of education and BMI where p-value=0.032. The result from hepatitis B awareness showed that 56.1% have heard about hepatitis B, about 16% got their information from educational institutes and (13.3%) from media. This is contrary to the study carried out by (1), who found that the major source of information was media. Majority of the respondents had no idea on the correct mode of prevention and control of Hepatitis B virus; this is in contrast to the high level of knowledge of correct mode of prevention and control in study conducted in Makurdi (2). There was significant difference between socio demographic characteristics such as marital status (p=0.001) and family income (0.015) and level of awareness of hepatitis B.

Table 1: Body Mass Index (BMI) distribution of Respondents

Variables	Frequency	Percentage (%)
Underweight (<18.5)	4	2.2
Normal (18.5-24.99)	91	50.6
Overweight (25.0-29.9)	57	31.7
Obese (30.0 and above)	28	15.5
Total	**180**	**100**

Table 2: Level of Hepatitis B awareness Among the Respondents

Variables	Frequency	
Heard of hepatitis B		
Yes	101	56.1
No	79	43.9
Heard it from		
Friends	28	15.6
Media	24	13.3
Relatives	15	8.3
Educational institution	28	15.6
Others	8	4.4
None	77	42.8
Hepatitis B is life threatening		
Yes	81	45.0
No	11	6.1
Don't know	88	48.9
It can be spread through Coughing and Sneezing		
Yes	43	23.9
No	39	21.7
Didn't know	98	54.4
It can be spread through casual Contacts		
Yes	45	25.0
No	38	21.1
Dont know	97	53.9
Mode of prevention and control of the virus		
knowledge and educatiom	32.0	17.8
blood test before marriage	20.0	11.1
Remain faithful to partner	9.0	5.0
Avoid sharing of sharp objects	9.0	5.0
Avoid casual sex	7.0	3.9
Use of condon during intercourse	6.0	3.3
No idea	97.0	53.9

Conclusion:

This present study had revealed that the level of Hepatitis B awareness among the respondents was poor; Judging from the anthropometric of the respondents, the nutritional status can be considered partially adequate where a little above half of the respondents had normasl BMI and almost half had different level of malnutrition.

Reccomendation:

Nutritionist, Government and different Health related organization should take necessary steps to increase the awareness on Hepatitis B virus and needs for adequate nutrient intake.

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OK4

Assessment of Dietary Diversity and Food Security Status of Nigerian Adults Amidst COVID-19.

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Keywords: COVID-19, Food security, Dietary diversity

BACKGROUND AND OBJECTİVES:
The immune system safeguards the host from pathogenic organisms (bacteria, viruses, fungi, parasites). To deal with this collection of threats, the immune system has evolved to include innumerable specialized cell types, communicating molecules and functional responses. This sensitive activity is complemented by an increased rate of metabolism, requiring energy sources, substrates for biosynthesis and regulatory molecules, which are all ultimately derived from the diet[1]. Therefore, this study assessed dietary diversity and food security status of Nigerian adults amidst COVID-19.

MATERIALS AND METHODS:
A descriptive cross-sectional, web-based study of 109 adults resident in Nigeria was conducted using a validated self-administered e-questionnaire. Socio-economic status, knowledge, attitude and practice of COVID-19 preventive measures of the respondents were obtained. Food security and dietary diversity scores of the respondents amidst the COVID-19 lockdown were assessed. Data were analyzed using IBM SPSS Statistics, version 21.

RESULTS AND DISCUSSION:
The result revealed that most (66.1%) of the respondents were females while 33.9% were males. Vast majority (97.2%) were young adults (18-45years old) while very few (2.8%) were old adults (above 45years old) of which 18.3% were married and 79.8% were single. The respondents were mainly Christians (96.3%) and of Igbo ethnicity (85.3%) and many (47.7%) reported earnings below ₦18,500 monthly since the lockdown was enforced. Most (65.1%) of the respondents had a good knowledge (>60%) of COVID-19 and

its preventive measures, 64.2% of them had a negative attitude towards COVID-19 preventive measures, while majority (95.5%) observed the correct COVID-19 preventive measures. Few (23.9%) of the respondents were food insecure (mean score = 61.54±11.20) and many (46.8%) had a low dietary diversity (<3 food groups being consumed) amidst the COVID-19 lockdown. There was a positive relationship ($r = 0.378$, $p<0.01$) between food security and low-income status (<₦18,500), which implies that as income decreased, food security decreased among the respondents amidst the COVID-19 lockdown. The state of food security and nutrition was already alarming before the outbreak of COVID-19 and was projected to further worsen with more people becoming food insecure as a result of the pandemic[2]. There was a positive relationship ($r= 0.306$, $p<0.01$) between having low income and being unemployed, as more low income respondents were reported to be unemployed during the COVID-19 lockdown. There was a negative and weak relationship ($r= -0.348$, $p<0.01$) between practice of COVID-19 preventive measures score and income status, with respondents of low income status having higher scores for practicing the preventive measures.

CONCLUSION:

This study revealed that low income level (<₦18,500) amidst a pandemic increased food insecurity among households. Hence, income is a determinant of food security and dietary diversification. These two factors strengthen the immune system which safeguards the host from pathogenic organisms (bacteria, viruses, fungi, parasites).

RECOMMENDATİON(S):

Government should prioritize intervention activities to the most vulnerable groups affected by COVID-19 and its impacts, such as the elderly, the ill, the displaced, and the urban poor. Dietary diversification should be factored in as the foundation for the distribution of food-based palliatives. Cash transfers and increased awareness on COVID-19 preventive measures should be directed to low income households in order to prevent double jeopardy of malnutrition and COVID-19 fatality.

Table 1: Relationship between socio-economic characteristics, knowledge, attitude, practice, food security and dietary diversity of the respondents.

	Unemployed	COVID-19 preventive measures Scores			Food Security Score	Dietary Diversity Score
		a. Knowledge	b. Attitude	c. Practice		
Low Income Status	0.306(0.002)**	0.045(0.657)	-0.071(0.486)	0.348(0.000)**	0.378(0.000)**	0.046(0.655)
Unemployed		-0.171(0.078)	-0.168(0.083)	-0.083(0.396)	0.185(0.056)	0.039(0.686)
Knowledge Score			0.148(0.124)	-0.027(0.784)	-0.124(0.199)	0.083(0.390)
Attitude Score				-0.038(0.692)	-0.025(0.798)	0.102(0.291)
Practice Score					-0.154(0.111)	0.010(0.921)
Food Security Score						-0.163(0.090)

Values are Pearson's correlation coefficient (p-value)

**. Correlation is significant at the 0.01 level (2-tailed).

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OK5

The Implication of Socio-Economic Status on the Anthropometric and Dietary Intake of School Age Children in Selected Schools in Ogun State

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KEY WORDS: Anthropometry, WASH, stunting, RDA

BACKGROUND AND OBJECTIVES:
This study assessed the anthropometric indices and dietary intake of rural and urban school age children in selected Local Government Areas (LGAs) of Ogun state. A multistage sampling technique was used to select one thousand one hundred and Thirty two school age children from the three senatorial districts. A pre-tested and structured questionnaire was used to obtain information on socio-economic characteristics as well as anthropometric measurements (weight, height and mid-upper arm circumference) were taken using standard anthropometric procedures and nutrients intake estimated from the 24-hr dietary recall information. Data were analyzed using frequency counts, percentages, means, standard deviations, correlation, T-test and Chi-Square.

RESULTS AND DISCUSION:
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 61.1% of the respondents did not have a place for handwashing and 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. Prevalence of wasting, stunting, underweight and overweight were 2.7, 20.6, 18.5 and 6.1% respectively, with significant gender ($p=0.000$) and sector ($p=0.003$) differences. Dietary intake showed that energy intake was above 60% RDA for both sexes and in the LGAs while protein and fat intake for females in urban LGA was above 80% RDA except for some micronutrients that were below 50% RDA (Vit A- 42.5% RDA, Calcium – 45% RDA and Iron – 48.9% RDA). Chi-square showed a significant association between maternal education and stunting ($p=0.014$), family income and stunting ($p=0.038$) and wasting ($p=0.003$) while correlation shows a significant relationship between micronutrients and economic status of the family because stunting was related to vitamin A ($p= -0.321$) and iron ($p= -0.120$).

CONCLUSION AND RECOMMENDATIONS
This study concluded that a significant relationship exists between socio economic status and nutritional status. Hence, the study recommended a national policy for improved sanitation, school feeding

programmed and combining such a policy with better access to basic social services including education and health care.

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NUTRITION SOCIETY OF NIGERIA

KADUNA 2020

50th ANNUAL GENERAL MEETING AND SCIENTIFIC CONFERENCE

15-19th November, 2020

Theme:

Improving Nutrition Intervention Outcomes in Nigeria through Evidence-Based Nutrition, Data Generation and Dissemination

BOOK OF ABSTRACTS

Supplementary

NUTRITION SOCIETY OF NIGERIA

BOOK OF ABSTRACTS

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 includes, 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 purse 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

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CONTENTS

SUB-THEME I: NUTRITION INTERVENTIONS THROUGH THE USE OF NUTRITION-INTEGRATED AGRICULTURE, FUNCTIONAL FOODS AND NUTRACEUTICALS

ABSTRACTS ID	ABSTRACTS TITLE	AUTHORS
OI5	Effect of Leaching cassava mash in water on the Glycemic Index of Garri	Okwulehie, F.C[1], Ngwu, E.N[2] and Mbah, C.A[3]
PI19	Minerals Composition Of Four Mango Fruits Consumed In Enugu State	*[2]Maduforo A.N.; [1]Chukwu C.C.; [1]Okwara C.C.; [2]Maduforo M.C.; [2,3]Okoro C.E
OI20	Glycaemic Response Of Jollof Rice Made From Four Rice Varieties Consumed In Nigeria	*[1]Maduforo A.N.; [1]Ugwu L.C.; [1,2]Okoro C.E.; [3]Okwara C.C.; [1]Maduforo M.C.; [1]Ngwu E.K.; [1]Chikwendu J.N.; [4]Ndiokwelu C.I.

OA1

Application of the Revised 2008 WHO-IYCF Indicators in Nigeria; A Meta-Analysis of the Core Complementary Feeding Indicators

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KEYWORDS: Complementary feeding, Indicators, Application, Nigeria

BACKGROUND AND OBJECTIVE:
The lack of clear international recommendations for some aspects of Infant and Young Child Feeding (IYCF) has halted the development of universal indicators to define optimal feeding. A comprehensive set of validated core IYCF indicators replaced the previous guideline and created a consensus on breastfeeding and complementary feeding (CF) indicators (1). These revised indicators have been widely generated in national studies, as evidence have shown that the Demographic and Health Surveys of countries have totally adopted these core IYCF indicators. It remains unknown how local studies have applied these core CF indicators in their data generation. This study aimed to evaluate the rate of adoption of core CF indicators in Nigeria.

MATERIALS AND METHODS:
Meta-analysis of literatures on complementary feeding indicators utilized in Nigeria by articles published from 2009-2019 was reviewed. Review of abstracts and full texts followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A bibliographic survey was carried out in these databases; Google scholar, PubMed, and African Journal Online (AJOL). The descriptors used were; Infant and young child feeding practices, Complementary feeding practices, 6-23 months, Nigeria, combined with boolean "OR" and "AND" operators. Studies on special needs or HIV/AIDS children were excluded. A total of thirty-three (33) articles met the inclusion criteria. Eligible studies were compared to the revised core complementary frequency indicators. Data was analyzed using SPSS version 22.

RESULTS AND DISCUSSION:
Results on trends in the mean utilization of CF indicators by reviewed articles showed that none of the core CF indicators were utilized in articles published from 2009 to 2015. Recent studies on IYCF published in 2015, 2016, 2017 and 2019 reported a mean utilization score of 0.4, 0.75, 1.33 and 1.50 respectively out of an available five (5) indicators. Results on the application of individual core CF indicators in data

generation showed that; introduction of semi-solid foods (75.8%) and minimum meal frequency (36.4%) indicators were inappropriately utilized. Consumption of iron rich foods/supplements indicator was unavailable in all (100%) the reviewed studies. The observed abysmal/slow adoption of these indicators agrees with assertions by Hajeebhoy *et al*., (2) that complementary feeding indicators do not enjoy the same degree of understanding and visibility of breastfeeding indicators which are well understood and effectively utilized/applied.

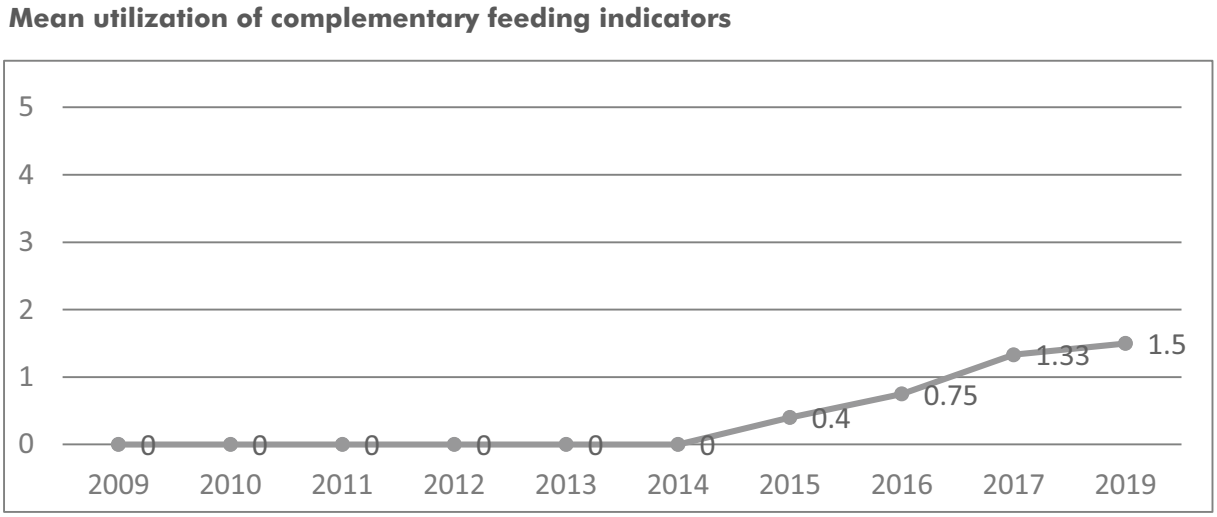

Fig 1. Trends in the mean utilization of complementary feeding indicators (2009-2019).

Table 1. Adoption of individual core IYCF indicators

	Appropriate		Inappropriate		Unavailable	
	F	%	F	%	F	%
Introduction of semi-solid foods	3	9.1	27	81.8	3	9.1
Minimum Dietary Diversity	5	15.2	1	3.0	27	81.8
Minimum Meal Frequency	5	15.2	12	36.4	16	48.5
Minimum Adequate Diet	5	15.2	0	0.0	28	84.8
Consumption of Iron rich foods or iron fortified foods/supplements	0	0.0	0	0.0	33	100.0

Appropriate =Indicators generated in accordance to specified guidelines/recommendation
Inappropriate=Similar to core IYCF indicators but recommended age/categories not considered
Unavailable = IYCF core indicators not generated at all

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OG1

Improving the Nutritional Content of School Meals to Address the Double Burden of Malnutrition: A Review of Nutrient Standards of the National Home Grown School Feeding Program

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Keywords: Double burden of malnutrition, Nigeria, Nutritional guidelines and standards, School Feeding Programs

BACKGROUND AND OBJECTIVES

The National Home Grown School Feeding Program (NHGSFP) is one of the Social Investment Programs (SIPs) to tackle poverty, improve the health and education of children and other vulnerable groups. It is a government-led school feeding program (SFP), targeting school children at public primary schools, grades 1-3 (6-11 years), using food that is locally grown by small holder farmers. The program aims to improve child nutrition and health as well as school enrolment and completion and the local economy[1]. The nutritional status of school- aged children has an influence on their health, physical development, cognitive potential and overall educational achievement. However, SFPs in low- and middle- income countries (LMICs) have shown gaps in terms of guidance on nutrition standards and menu compositions of school meals[2]. This implies that SFPs should be designed appropriately through evidence- based guidance to address nutrition issues and promote healthier lifestyles. In efforts to improve the challenges in the implementation of SFPs in Nigeria, a National Technical Expert Committee on the NHGSFP was commissioned by the government in 2017. They have recently finalized the nutrition targets for the NHGSFP to address the absence of meal standardization. The objective of this study is to analyse the nutrition targets of the NHGSFP to identify nutritional gaps to address the double burden of malnutrition and how the food industry can partner with the NHGSFP to help realise these targets.

METHODS

The recently finalized nutrient targets for the NHGSFP was reviewed to reveal nutritional gaps for improvement to tackle the double burden of malnutrition. That is, to what extent these targets will address undernutrition especially micro nutrient deficiencies as well as overweight and obesity. Afterward, stakeholder discussions were held with the NHGSFP and food industry representatives to further explore the results of the review.

RESULTS

The nutrient targets for the NHGSFP will provide the minimum targets for quantities of nutrients that should be provided by school meals. It proposes meeting 30 to 50 percent of total daily dietary requirement for SFPs that children spend half day in school. This is in accordance with the Home Grown School Feeding resource framework technical document. The nutrient targets include macro nutrients (energy, protein and fat) and micro nutrients (iron, iodine, vitamins A and C, zinc and folate). Additionally, the committee recommended diet diversity target according to WHO of at least four out of the seven food groups daily. These targets are ambitious (up to 50% of the RNI) and it is not clear to what extent the targeted levels can be realised from home grown, largely plant-based meals. Monitoring and evaluation data are not yet available.

Although the nutrition targets for the NHGSFP will include provision of micronutrients that are of public health significance for school aged children, the report on analysis of SFPs worldwide has shown that home grown meals do not have the appropriate amount of micronutrients[3]. Hence, should be complemented by fortification to enhance the nutritional value. It noted that fortification is not included in some programs due to lack of national capacity and also because food is being purchased close to the schools, which means there is little probability of food being fortified. It recommends that programs should consider the trade-offs between nutrition and local procurement. Complementary interventions such as micronutrient fortification and supplementation in school feeding programs improved micronutrient status and reduced the prevalence of anaemia. Complementing school meals with fortification may require food processing as an additional step in the value chain[4]. In that case, the food industry will need to be included in the NHGSFP to meet the daily RNI.

In addressing childhood obesity, the NHGSFP nutrition committee do not currently see the need for placing limits on salt, sugar and fat consumption in the program since obesity and overweight are not yet considered a public health and nutrition priority among school- aged children in Nigeria. The nutrition transition in Nigeria is evident with associated increase in the prevalence of obesity. This epidemic has severe consequences including increased susceptibility of developing diet- related Non- Communicable Diseases (NCDs) later in the future. Besides, studies have shown that premature deaths and morbidity are highest in LMICs. Surprisingly, there are no studies on the nutritional situation of school aged children in Nigeria. Nevertheless, a systematic review of school aged children and youths in Sub- Saharan Africa provides evidence for overweight and obesity transition in these groups. Therefore, prevention of childhood obesity and overweight needs to be a high priority[5]. A recent report by FAO on SFPs in 33 LMICs recommended that there should be emphasis on setting upper limits for saturated fats, sugar and salt for school meals. Likewise, studies has shown that the nutritional impact of school feeding programs in LMICs should consider their contribution to obesity.

Stakeholder discussions with the NHGSFP concluded that there is a challenge to improve the nutritional value of school meals especially, to meet the micronutrient requirements for school children merely through home grown meals. School meals may need to be complemented by fortified food products as biofortified crops or fortification of local products, which are often available, or too expensive. Collaboration with national food industry, who have the capability to supply high quality food products at affordable prices due to their scale, is seen as a potential sourcing option, but requires clear guidelines on micronutrients as well as upper limits for saturated fats, trans fats, salts and sugars. Currently, the NHGSFP do not have a lot of processed foods, only high energy biscuits, yoghurt and cheese. Stakeholder discussions with the food industry indicate that they would welcome collaboration with the NHGSFP under the following conditions: 1) Nutritional guidelines and food procurement standards should be science-based, coherent with global standards and technically achievable 2) Small and medium sized food companies would like to get technical assistance to develop / reformulate their food products to comply with these standards; 3) The Federal and/or State governments should be willing to negotiate longer term purchasing contracts, so that the industry's investments can be earned back.

CONCLUSION AND RECOMMENDATIONS

The nutrient targets for the NHGSFP are focused on energy provision and addressing micronutrient deficiencies. These targets are ambitious and it is not clear to what extend the targeted levels can be realised. Complementing home grown school meals with fortified food products may help to meet the proposed micronutrient targets. The NHGSFP is willing to consider this and the food industry as well. Conditionally to such a proposed public-private partnership are the availability of science-based, product group specific nutrient criteria for micronutrients as well as for nutrients of which the intake should be limited (sugars, sodium, saturated fat and trans-fat). Such criteria, developed by an independent scientific committee, can serve as procurement standards for home grown school meals as well as a guide for foods available in the school environment. It also provides a way for the food industry to contribute to the sustainability and nutrition objectives of the NHGSFP.

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OH8

Assessment of Micronutrient Status of Pregnant Women Attending Antenatal Care at Barau Dikko Teaching Hospital, Kaduna.

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KEYWORDS: Pregnant women, Micronutrients, Nutritional Status.

BACKGROUND AND OBJECTIVES:
Pregnancy is often affiliated with continuous and recurrent changes in metabolic demand and physiological status of women. Nutritional status assessment is a critical component of the nutritional care because adequate nutrition is needed to sustain the mother as well as for the development of the foetus. This study seeks to assess nutritional status and micronutrient status (Iron, Zinc, Selenium, Copper and Vitamin A) of pregnant women attending antenatal care at the Barau Dikko Teaching Hospital Kaduna state, Nigeria.

MATERIALS AND METHODS:
150 pregnant women in different trimesters were sampled by stratified random sampling. Anthropometric assessment was used to determine nutritional status. Established methods for quantitative determination of Serum Vitamin A, Serum Zinc, Serum Copper, Serum Selenium and Serum Ferritin were used in determining pregnant women's micronutrient status. Relationships among micronutrient status and dietary pattern of the pregnant women were determined by Chi square.

RESULTS:
Demographic characteristics revealed the pregnant women were mostly aged between 28 to 31 (24.7%). Majority of the pregnant women were in their second trimester (53.3%). Prevalence of Severe Acute Malnutrition was 63.0% while Moderate Malnutrition was 16%. 63.3% of the pregnant women had suboptimal levels of Vitamin A. 68.9% were severely deficient in Zinc, 43.3% were deficient in selenium, 7.8% were deficient in copper and 86.7% were deficient in Iron. Pearson's correlation analysis among the

pregnant women's micronutrient status showed significant association between the Iron and Vitamin A concentrations as well as between Copper and Iron concentrations.

CONCLUSIONS:

The prevalence of vitamin A and Iron deficiency in pregnant women was very high despite the supplementation, this indicates a serious public health issue. Iron deficiency in pregnancy is often associated with aneamia, which in turn increases the rate of maternal morbidity and mortality. The study also observed that there was a significant correlation between vitamin A and Iron status as well as negative correlation between copper and iron status in pregnancy. The fact that majority of the women resumed antenatal care in their 2nd and third trimester, could also indicate that they didn't start supplementation on time coupled with diets deficient in iron and vitamin A may have affected the suboptimal levels of these micronutrients during pregnancy.

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OH28

Determinants of Early Initiation of Breastfeeding among Primiparous and Multiparous Mothers in Two Selected Hospitals in Ibadan North Local Government Area, Nigeria.

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Keywords: Early initiation of breastfeeding, Parity, Determinants, Ibadan.

Background and Objectives:
Putting newborns to the breast within 1 hour of birth is understood to be Early Initiation of Breastfeeding (EIBF). It is important for both the mother and child. However, the rate of EIBF is low (1). While several factors parity inclusive have been identified to be associated with EIBF (2, 3), the role of these factors in the practice of EIBF among primiparous and multiparous is not clear. The study was designed to assess the determinants of early initiation of breastfeeding among primiparous and multiparous mothers in two selected hospitals in Ibadan north local government area, Nigeria.

Methodology:
A total of two hundred and ten mothers consisting of 87 primiparous and 123 multiparous mothers, respectively with their newborns were recruited randomly from the lying-in wards of the tertiary hospitals in Ibadan North Local Governments (LGA). Semi structured, interviewer-administered questionnaire was used to obtain data on socio-demographic characteristics and knowledge on breastfeeding and breastfeeding initiation using thirteen item questions, breastfeeding initiation pattern as well as maternal, neonatal and health workers factors influencing breastfeeding initiation of the mothers.

Results and Discussion:
More than two-third of both set of mothers had adequate knowledge of breastfeeding but multiparous mothers were more knowledgeable about when to initiate breastfeeding (87.0%) as well as colostrum feeding (84.6%) as compared to primiparous mothers (73.6% and 63.2% respectively). EIBF was at 39.5% overall; 26.2% for multiparous mothers and 13.3% for primiparous mothers. Both multiparous and primiparous mothers stated fatigue due to labour pain and caesarean section the most as the cause of delayed initiation, this was followed in descending order by separation of mother and child, clinical routine, mother not lactating and baby was sleeping. More multiparous mothers gave colostrum/ expressed breastmilk as the first food. Pre-lacteal feeds specifically infant formula although low was more on the side of primiparous mothers. In the multivariate analysis, the independent variables shown to be associated with early initiation of breastfeeding among primiparous mothers were monthly income (OR = 4.94, 95% CI: 1.35- 18.03) and immediate skin to skin contact (OR = 0.29, 95% CI: 0.09-0.89) while for multiparous mothers, the type of first food given to neonates, spouse's educational level, method of anaesthesia used,

education about EIBF during ANC and after delivery were found to be associated with EIBF but was not statistically significant (p> 0.05).

Conclusion and Recommendation:

Both primiparous and multiparous mothers had adequate knowledge of breastfeeding as well as high awareness about EIBF; this did not translate into practice. Furthermore, monthly income and immediate skin to skin contact was found to influence EIBF among first time mothers. Delayed initiation of breastfeeding was as a result of fatigue due to the effects of anaesthesia from CS and labour pains, separation of mothers from their newborns due to complication, clinical routine and delayed lactation among the two mothers. Healthcare providers must be actively involved in maternal and newborn care with more attention given to first time mothers. Other determinants of EIBF must be identified by further research.

Table 1: **Breastfeeding Initiation among primiparous and multiparous mothers**

	Parity		**Total**
Initiation category	Primiparous mothers N (%)	Multiparous mothers N (%)	
Early	28 (13.3)	55 (26.2)	83 (39.5)
Late	59 (28.1)	68 (32.4)	127 (60.5)
Total	87 (41.4)	123 (58.6)	210

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OH29

Performance Indicators of Outpatient Therapeutic Programme in the Management of Severe Acute Malnutrition in Zaria.

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Keywords: outpatient therapeutic programme, severe acute malnutrition, performance indicators.

BACKGROUND AND OBJECTIVES

Malnutrition is of public health concern and major contributor of childhood morbidity and mortality among children in sub-Sahara Africa and South-Asia [1]. Outpatient Therapeutic Programme (OTP) manages children with Severe Acute Malnutrition (SAM) without complications at community level. Performance and treatment outcomes of OTP for the management of SAM in children are less explored [2]. Thus, this research fills that gap by providing information on the prospective performance indices of the OTPs in Zaria.

MATERIALS AND METHODS

Consented caregivers (224) and their children were recruited within 4 weeks among 3 OTP centers in Zaria LGA. Information on socio-demographic characteristics of the caregivers were collected using pre-tested questionnaires by trained interviewers. The children were followed up for 16 weeks from admission. The performance indices assessed were: cure rate, death rate, default rate, Average Weight Gain (AVG) per week and average length of stay. The indices were later compared with SPHERE standards [3] to assess their performance.

RESULTS AND DISCUSSION ii

Table 1 revealed that cure rate, death rate and default rates of the OTPs were 48.10%, 1.70% and 43.1% respectively. While the average weight gain and length of stay were 7.5g/kg/day and 8.2 weeks respectively. The performance indicators were alarming except the death rate. This can be attributed to lack of proper adherence to the protocols from both the health workers and the caregivers or inadequate funding of the programme by the government.

Table 1: Performance Indicators of OTPs in Zaria LGA and Sphere Standard.

Performance Indicators	Percentages	Acceptable	Alarming
Cure Rate	48.10±5.55	>75%	<50%
Death Rate	1.70±0.48	<10%	>15%
Default Rate	43.08±2.95	<15%	>25%
Non-Recover Rate	7.12±3.78	No standard	No standard
Average Weight Gain	7.54±5.25		<8g/kg/day
Length of Stay	8.16±1.04	>6weeks	<4weeks

CONCLUSION AND RECOMMENDATION

The OTPs in Zaria were not performing according to the sphere standards. Therefore there is need for the government to invest more in the programme so as to work effectively.

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OH30

Incidence of severe acute malnutrition after treatment: A prospective matched cohort study in Sokoto State, Nigeria

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Keywords: severe acute malnutrition (SAM), community-based management of acute malnutrition (CMAM), outpatient therapeutic program (OTP).

Background and Objectives:
Severe acute malnutrition (SAM) among (SAM) among children in Nigeria is tackled through the outpatient therapeutic program (OTP) of the *Community-based Management of Acute Malnutrition* (CMAM) programme (1). CMAM is evidently effective in achieving nutritional recovery (2), but little evidence exists on the remaining risk of SAM relapse for children discharged as cured from OTP. We aimed to measure and compare the 6-month incidence of SAM among OTP-cured and community control children and to identify factors associated with relapse among OTP-cured children.

Materials and Methods
We conducted a prospective cohort study that tracked 553 OTP-cured and 526 control children in Sokoto State, northern Nigeria. Outcomes and covariates were measured fortnightly in up to 12 home visits. Covariates to be tested for correlation with relapse were selected using domain knowledge and automatic feature selection methods. We used multivariate Cox and accelerated time failure models using those covariates to identify significant risk correlates.

Results and Discussion:
SAM incidence rates were 52-times higher in the OTP-cured cohort (0.204/100 child-days) than in the community control cohort (0.004/100 child-days). Children with lower mid-upper arm circumference at OTP admission, with lower height/length-for-age z-scores, whose household head did not work over the full year, who lived in an area previously affected by environmental shocks, who were female, and who had diarrhea prior to the home visit had a significantly higher relapse risk.

Key background characteristics of children included in the study

Variable	OTP-cured		Community controls		Difference
	Estimate	N	Estimate	N	
Child level					
Male, % (CI)	52.3 (48.1-56.4)	553	52.5 (48.2-56.7)	526	-0.2
Age in months, mean (SD)	19.2 (7.5)	553	18.9 (7.6)	526	0.2
Appropriately fed, % (CI)	18.5 (15.5-22)	551	20.0 (16.8-23.6)	526	-1.5
Had diarrhea in the two weeks preceding the first home visit, % (CI)	53.0 (48.8-57.1)	553	51.5 (47.2-55.8)	526	1.5
Received basic immunization, % (CI)	5.6 (4-7.9)	553	3.8 (2.5-5.8)	526	1.8
Stunted, % (CI)	87.3 (84.2-89.9)	535	46.3 (42-50.6)	523	41.0***
Mother level					
No education, % (CI)	95.3 (93.2-96.8)	553	96.0 (94-97.4)	526	-0.7
Age in years, mean (SD)	28.5 (7.2)	553	27.5 (6.4)	526	1.0*
Attended antenatal care for study child, % (CI)	55.9 (51.7-60)	553	56.3 (52-60.5)	526	-0.4
Age at first birth in years, mean (SD)	17.6 (2.2)	553	17.7 (2.4)	526	-0.1
Number of live births, mean (SD)	4.7 (2.7)	553	4.2 (2.4)	526	0.5***
Household level					
Number of household members, mean (SD)	7.3 (3.9)	553	6.9 (3.6)	526	0.3
Age dependency ratio, mean (SD)	149.2 (81.1)	541	138.5 (75.3)	509	10.7*
Household head works, % (CI)	96.0 (94-97.4)	553	98.1 (96.5-99)	526	-2.1**
Household head has no education, % (CI)	78.1 (74.5-81.4)	553	75.1 (71.2-78.6)	526	3.0
Household in lowest two wealth quintiles, % (CI)	47.4 (43.2-51.6)	553	40.5 (36.4-44.8)	526	6.9**
Severely food insecure, % (CI)	26.0 (22.5-29.9)	553	25.9 (22.3-29.8)	526	0.2
Notes: CI, confidence interval; SD, standard deviation. Significance stars correspond to p-value ranges for a Wald test of *** p<0.001, **p<0.01, *p<0.05.					

SAM survivors are at significant risk of relapse in the 6 months following discharge from treatment, with 24% relapsing in this context. Therefore, reducing relapse would substantially reduce the SAM burden in Northern Nigeria. Periodic monitoring of children who have been discharged from CMAM program as cured is needed to ensure early detection of at-risk cases.

Conclusion

Our study shows that OTP-cured children remain at significant excess risk of SAM. To improve long-term health outcomes of these children, programs using a CMAM-type approach should strengthen follow-up

care and be integrated with other preventive services.

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OI5

Effect of Leaching cassava mash in water on the Glycemic Index of *Garri*

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Key Words: Effect, Leaching, Cassava, Glycemic Index, *Garri*

Background and objectives

Garri is a fine, fermented and roasted coarse, granular flour of varying texture produced from cassava (*Manihot esculenta* Crantz) tubers. It is a cheap and good source of vigorous energy. Its ability to store well and ease of preparation as a convenience food are responsible for its tremendous popularity amongst the city dwellers both in Nigeria and other West African countries (1, 2). Starch and fibre are the major components of carbohydrate contained in *garri* with low protein content and some essential vitamins[3]. The high fibre content of *garri,* which is mostly insoluble fibre makes it very filling, and good in reducing the likelihood of bowel diseases. The consumption of foods exhibiting a high Glycemic Index is associated with the development of diseases such as type 2 diabetes and increase risk of cardiovascular diseases and obesity (4). The need for increasing food choices of the diabetic patients necessitated this study on the effect of leaching on the glycemic (GI) of *garri*.

Materials and Method

The experimental design was adopted using two cassava varieties: a local variety known as *Nwaocha* 'Land Raise' and an improved variety TMS 30575 developed by the International Institute of Tropical Agriculture (IITA), each cassava variety used was processed into eight samples. The volume of water (VOW) used for leaching was graded into four levels and samples coded based on the treatment thus: 10.0 liters ($F_{48}L_{10.00}$), 5.0 liters ($F_{48}L_{5.00}$), 2.50 liters ($F_{48}L_{2.50}$) and 1.25 liters ($F_{48}L_{1.25}$) for local and improved varieties. The quantity of cassava mash leached at a time was one kilogram (1kg) and fermented for 48 hours. Eight other samples were processed for the study to check the effect of leaching and fermentation. Seven normoglycemic adult volunteers were used to determine the GI of the food samples. Data generated were subjected to one-way analysis of variance (ANOVA) and students't-test procedure of statistical assessment was used to check for

differences of treatment in the cassava varieties. Mean values were further separated using fisher's least significant difference (LSD) and significant was accepted at $P < 0.05$.

Results and Discussion

The result shows that sample $F_{48}L_{10.00}$ of local and improved varieties had the least value (43.08±10.61 & 39.31±5.85), respectively. This could be attributed to the effect of leaching with the highest (10.0 liters) volume of water (VOW). The result further shows that the GI of both varieties were not significantly different ($P< 0.05$) but the local variety had apparent higher GI than the improved variety. The difference observed in samples $F_{48}L_{1.25}$ (51.54±8.89 & 50.36±22.86) and sample $F_0L_{1.25}$ (54.80±12.32 & 51.79±21.73) of both varieties leached with the same VOW (1.25L) could be attributed to the effect of fermentation. All the *garri* obtained from cassava mash fermented for 48 hours had GI values with the classification of low GI foods (with values lower than 55). Leaching of cassava mash in water significantly reduced the components of starch and sugar (carbohydrate) and subsequent increase in the fibrous material left in the mash and led to the production of low GI *garri*.

Conclusion and Recommendation

Among the *garri* samples in this study, those leached with 5 liters and 10 liters of VOW had significantly lower GI. This implies that leaching may have more significant effect on the GI of *garri* as the VOW used for leaching increases and that of fermentation would further reduce the GI *garri*. It is therefore recommended that *garri* should be leached and the fermentation period prolonged to reduce the GI of *garri* for the purpose of consumption by target groups such as the diabetic patients.

Table 4.27: Glycemic Index (GI) of *garri* samples from local and improved cassava varieties containing 50g available carbohydrates:

Treatment	Local variety	Improve variety	*P-value(0.05)*	Remarks
$F_0L_{0.00}$	$69.50±10.96^{b}$	$61.17±11.14^{b}$	0.317	NS
$F_{24}L_{0.00}$	$58.22±13.37^{c}$	$53.13±14.51^{bc}$	0.664	NS
$F_0L_{1.25}$	$54.80±12.32^{cd}$	$51.79±21.73^{bc}$	0.816	NS
$F_{48}L_{0.00}$	$53.70±10.96^{cde}$	$51.28±22.15^{bc}$	0.902	NS
$F_{48}L_{1.25}$	$51.54±8.89^{cde}$	$50.36±22.86^{bc}$	0.800	NS
$F_{48}L_{2.50}$	$48.41±13.37^{cde}$	$46.71±14.57^{bc}$	0.755	NS
$F_{48}L_{5.00}$	$46.50±8.13^{de}$	$43.47±16.02^{cd}$	0.507	NS
$F_{48}L_{10.00}$	$43.08±10.61^{e}$	$39.31±5.85^{d}$	0.185	NS
WB	100^{a}	100^{a}		
LSD	11.1	17.2		

Keys:

CAM = Cassava mash, WB = white bread (Reference food), LSD =Least significant difference, VOW = Volume of Water

$F_{48}L_{10.00}$ = Leached 10L VOW /1kg CAM, fermented 48h, $F_{48}L_{5.00}$= Leached 5L VOW /1kg CAM, fermented 48h,

$F_{48}L_{2.50}$= Leached 2.50L VOW /1kg CAM, fermented 48h, $F_{48}L_{1.25}$= Leached 1.25L VOW /1kg CAM, fermentation 48h

$F_{48}L_{0.00}$ = Not leached, fermented 48h, $F_{24}L_{0.00}$ = Not leached, fermentation 24h

$F_0L_{0.00}$ = Not leached, not fermented, $F_0L_{1.25}$ = Leached 1.25L VOW, not fermented

Different superscripts along a column represent significant differences of the same attribute as a result of difference in treatment.

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PI19

Minerals Composition of Four Mango Fruits Consumed in Enugu State

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Keywords: *Mango, minerals,*

ABSTRACT

Background:

Mango fruit (*Mangifera indica*) is a delicious juicy drupe, commonly consumed in Nigeria. It is commonly consumed in West Africa as whole fruits when in season or as juices by technology. Although there have been studies on nutrient composition of mango but there is lack of scientific data on the micronutrient and phytochemical composition of varieties of mango fruit based on average portion size. This study determined the micronutrient and phytochemical composition in a portion size of four mango varieties; Sweet mango (SM), Haden mango (HM), German mango (GM) and Alphonso mango (AM).

Objectives:

This study determined someminerals composition of four mango fruits consumed in Nsukka, Enugu state.

Methodology:

Samples of four mango varieties (Opioro, Alphonso, Haden, and Sweet) were randomly selected from different markets in Nsukka, Enugu state, Nigeria. Seven ripe mangoes from each variety were randomly selected, washed and weighed. The edible portions were separated, homogenized and subjected to chemical analysis to determine the micronutrient and phytochemical content using standard methods. The weight of each variety was standardized to derive the mean weight and used to calculate the average composition in a portion. Descriptive statistics (mean and standard deviation) was used to present the data obtained while analysis of variance (ANOVA) was used to compare the means and turkey HSD test was used to separate the means. Significance level was accepted at $p<0.05$.

Results:

The average weight of the four mango varieties are 124.14g for GM, 121.71g for AM, 192g for HM and 91.14g for SM. The calcium content per portion was statistically similar ($p>0.05$) in Opioro (113.41 mg), Alphonso (130.05 mg) and Sweet (146.1 mg) mangoes. The magnesium content of Opioro mango was significantly ($p<0.05$) least (0.67 mg) in standardized portion. The zinc content of Opioro and Alphonso was not significantly different ($p>0.05$) in standardized portion. The iodine content was comparable ($p>0.05$) but iron and phosphorous content significantly ($p<0.05$) differed across the samples per standardized portion size. Sweet mango had the highest content of iron, magnesium, phosphorous and potassium per

100g edible portion.

Conclusion: This study shows the micronutrient and phytochemical composition of different mango varieties per portion size, which is vital in dietary counseling and portion size control.

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Glycaemic Response of Jollof Rice Made From Four Rice Varieties Consumed in Nigeria

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ABSTRACT

Background: Rice is one of the commonest staple food consumed in Nigeria. Different rice varieties are eaten in Nigeria. Some of these rice varieties are imported while some are locally produced in Nigeria. The imported long grain variety is usually what is used by many homes and during occasions. However, importation of rice is banned in Nigeria to encourage local production in recent times. Imported rice analysed in this study was basmati rice which is common Indian rice varieties sold in malls and supermarkets in Nigeria. Basmati rice is seen as rice for the rich persons in Nigeria because it is expensive. Sometimes, those suffering from diabetes and persons desiring to reduce weight who are rich as well tend to use it instead of the local rice consumed in Nigeria. The common local rice consumed in Nigeria is commonly called Adani or Abakaliki rice which is a short grain and produced in Ebony State where the name was derived. Although the rice is cultivated in other parts of Nigeria. Another brown short grain variety mostly consumed in south western Nigeria in the variety used in cooking "ofada rice". Different persons have different notions about the glycaemic response of these rice varieties but the opinions are mostly based on individual experience and not from empirical studies.

Objective:

The study assessed the glycaemic index [GI] and glycaemic load [GL] of jollof rice made from four rice varieties (long grain imported rice, basmati rice, white short grain Adani rice and brown short grain ofada rice).

Methodology:

The different varieties of rice were obtained from Ogige main market, Nsukka and Shoprite mall Enugu, both in Enugu state, Nigeria. The cooking of all the rice varieties was standardized into jollof rice by adapting and modifying five online jollof rice recipes. The available carbohydrate content of the jollof rice dishes as consumed was determined using phenol-sulfuric acid method[1]. Glycaemic response was determined by standard method with 12 subjects for each sample[2]. The reference meal was 50g of anhydrous glucose. The GL was categorized as low, moderate or high, if it had respectively the lowest or equal to 10, 11 - 19, or greater than or equal to 20 while the GI values was classified as high (> 70), intermediate [medium] (>55 – < 70) and low (< 55)[3]. IBM SPSS statistics for windows version 22 was used to analyze the data obtained from the study. Descriptive statistics (mean and standard deviation) was used to present the data obtained. Analysis of variance (ANOVA) was used to compare the means while turkey honestly significant difference

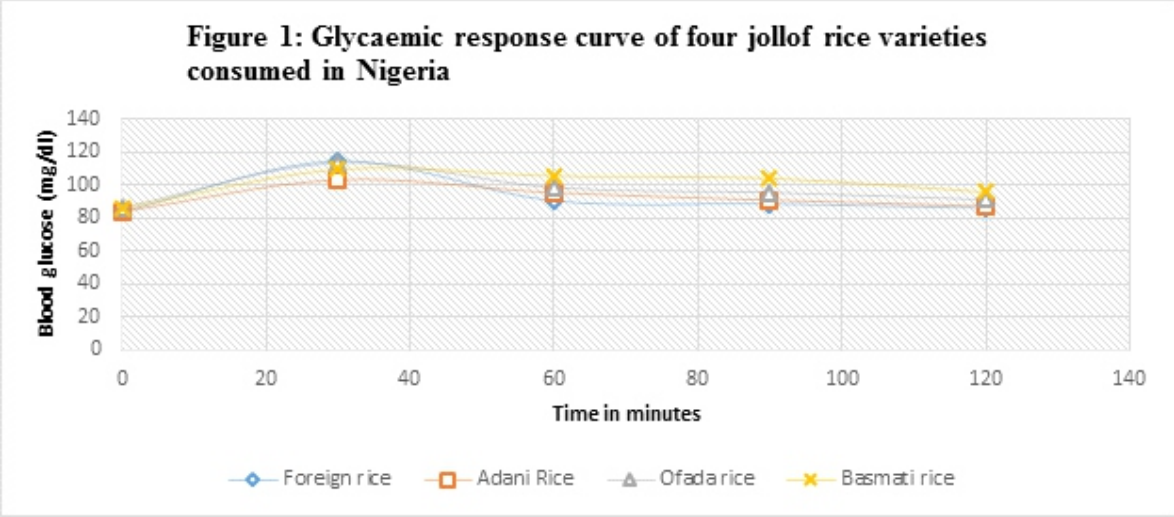
(HSD) was used for post-hoc analysis. A p-value < 0.05 was considered significant.

Results:

There was no significant difference (p>0.05) existing within the samples in the available carbohydrate content. The available carbohydrate ranged from 15.95g/100g to 16.25g/100g (Table 1). The quantity of jollof rice that will supply 50g of available carbohydrate were 313g for imported rice, 307g for Adani rice, 313.5g for Ofada rice and 308g for Basmati rice. All the jollof rice varieties had low GI and GL respectively (Table 1 and Figure 1). Adani and ofada rice had the least GI and GL respectively.

Table 1: The available carbohydrate content, glycaemic index, and glycaemic load of four jollof rice varieties consumed in Nigeria

Variety of Jollof Rice	Available Carbohydrate (g/100g)	Glycaemic Index (GI) (n=14)	GI Class	Glycaemic Load (GL) (n=14)	GL Class
Foreign rice	$15.96^{a} \pm 0.41$	27	low	4.33	low
Adani rice	$16.25^{a} \pm 0.28$	16	low	2.57	low
Ofada rice	$15.95^{a} \pm 0.12$	21	low	3.40	low
Basmati rice	$16.19^{a} \pm 0.36$	41	low	6.65	low



Discussion:

Rice is a good source of carbohydrate which is usually avoided by individuals suffering from diabetes mellitus, however, when oil and other ingredients are mixed with rice during cooking, it affects the glycaemic response as seen in this study. It has been reported that several factors could affect the glycaemic response of food which include the fat content, type of carbohydrate, fibre content, the cooking or food processing and anti-nutrients in foods[3-4]. Adani rice showed the lowest rise in blood glucose at 30 minutes while foreign rice showed the lowest rise in rise in blood glucose response at 60,90 and 120 minutes. However, Basmati rice had the highest increment of blood glucose response at 60, 90 and 120 minutes. Thus, this disproves the belief that locally cultivated Nigerian rice varieties are higher in carbohydrates than their counterpart imported varieties especially basmati rice. It is important to note that it is not all low GI or GL foods are low in fat or healthy to eat[2-4].

Conclusion:

The study concluded that jollof rice based on the four rice varieties had low GI and GL therefore, it could be recommended for persons with diabetes considering portion size control.

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