NUTRITION SOCIETY OF NIGERIA

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Theme:

Promoting Healthy Diets
Through Food Systems Transformation

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CONFERENCE PROCEEDINGS:

Book of Extended Abstracts

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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

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   - 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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OA1

Cost of Diet Assessment in Akinyele Local Government Area Oyo State, Nigeria

Akinyemi, I. O.[1], Adeyemi, O. A.[1], Ariyo, O.[1], Akerele, D.[2]
[1]*Department of Human Nutrition and Dietetics, Faculty of Public Health, University of Ibadan, Nigeria.*
[2]*Department of Agricultural Economics and Farm Management, Federal University of Agriculture Abeokuta, Nigeria*
iyanuakinyemi@gmail.com; +2348068678612

KEYWORDS: Food Environment, Prices, Affordability, Nutrient-adequate Diet

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:
The study was cross-sectional and used the Cost of Diet method developed by Save the Children International. Data was collected in eight communities (Onidundu, Ijaiye, Alabata, Iroko, Olorisaoko, Elekuru, Ikereku, Ajibade) in the major livelihood zone of the LGA. The leader for each community was interviewed to determine household wealth profiles and markets visited by poor households. Six markets (Ijaiye, Alabata, Olorisaoko, Elekuru, Ojoo, Moniya) identified across the communities, and four traders per food item per market, were surveyed to obtain food prices and corresponding weights, and seasonality in availability and prices. Interviews and focus group discussions were held with 35 women across communities to understand typical household sizes and composition, and household dietary habits.
Prices and weights were collected for 71 foods overall and foods were matched with nutrient composition data. Linear Programming Software (LiPS) was then used to determine the least cost diet that meets nutrient recommendations for a hypothetical household comprising two adults (a male and female) and five children (aged 12-23 months, 7-8 years, 9-10 years, 11-12 years, and 13-14 years). Foods not habitually consumed by households were then removed, leaving 52 foods, and LiPS was further used to determine the least cost nutrient-adequate diet based on habitual intakes. Data was collected between November 2018 and April 2019.

RESULTS AND DISCUSSION:

Agriculture was the main income source in the communities and community leaders perceived that 40% to 70% of households in their communities were worse off, earning between 100,000 and 500,000 per annum. The least cost of a nutrient adequate diet for the hypothetical household was 632.31 per day when all food items were considered. Foods included in this diet were semovita, soya beans, herring (*sawa* fish), palm oil, cassava flour (*lafun*), and Amaranthus leaves. When only foods consumed habitually were considered, cost increased slightly to 667.75 per day, and bitter yam replaced soya beans in the included foods. Households would thus need at least 19,000 monthly to obtain the least cost diet.

The least monthly cost for the household's habitual nutrient adequate diet is more than the perceived income of poor households in the communities, reflecting serious food insecurity. Moreover, although the diet meets nutrient needs of household members, it does not meet recommended diet requirements which include dietary diversity (households cannot eat the same thing every day), additional vegetable consumption as well as fruits consumption (3).

CONCLUSION AND RECOMMENDATİON:

The least cost nutrient adequate diet in Akinyele LGA is not affordable for poor households, even as it does not meet all requirements for a healthy diet. Improving diets among poor households will require more than nutrition education; implementing programmes that will increase access to nutritious foods all year round is indispensable.

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PA2

The Unsung Heroes; Contribution of Local Ngos in Reducing The Burden of Malnutrition in Nigeria.

Iheme G.O[1], Kupoluyi O.E[2], Egechizuorom I.M[3], Asouzu N.C[4], Onyekwere C.C[5], Adile A.D[6], Idris H[7], Edafioghor L.O[8] and Oyebamiji E.A[9]

[1]Michael Okpara University of Agriculture, Umudike; [2]Federal Medical Centre, Abeokuta;
[3]Federal Medical Center, Umuahia; [4]Alex Ekwueme Federal Univ. Teaching Hospital Abakaliki
[5]Lagos Univ. Teaching Hospital, Lagos; [6]Federal Teaching Hospital, Gombe
[7]Federal Medical Centre, Kastina; [8]Federal Medical Centre, Asaba
[9]University College Hospital, Ibadan
ihemegideon@gmail.com

KEYWORDS: Malnutrition, Non-governmental Organization, Local/Grassroot, Nigeria

BACKGROUND AND OBJECTIVES:

Non-Governmental Organizations (NGOs) have contributed to the development of communities around the world. In developing countries, government programs/interventions often have low coverage and quality, and there is evidence that facilitation by NGOs can improve health, economic and social service delivery performance in an equitable way (1).

NGOs vary considerably, they are typically classified as grass-root, support and intermediary/mid-level organizations or as local, national and international organization. Hence, this study was designed to assess the contribution of nutrition focused local/grassroot NGOs in reducing the burden of malnutrition in Nigeria.

MATERIAL AND METHODS

This cross-sectional, web-based study employed a non-probability (snowball) sampling technique to recruit 36 nutrition-focused local NGOs in Nigeria. The various NGOs were identified and the survey link shared to an active member of the selected NGOs. These accessible target population also forwarded the survey to representatives of other related NGOs. Descriptive statistics was computed using IBM SPSS version 25.

RESULTS AND DISCUSSION

Study revealed that the selected NGOs addressed diverse nutrition problems. They comprised less than 5 (27.8%) and 5-20 (38.8%) members. Most of the NGOs were newly established (1-3 years -63.9%), generate funds from members contribution/public donations (58.3%) and publicize their activities on social media (11.1%). Lack of funds (11.1%) was the major challenge experienced.

Although evidence have shown that several agencies, donors, and development partners channel their funds for community development through NGOs (2-3), it is not clear whether these local NGOs have access to these funds. This may be responsible for the perceived low continuity as reflected in the abudance of newly established NGOs and paucity of older NGOs in this study.

Results showed activities conducted by the studied NGOs, it was observed that 22 (61.1%) of the NGOs could estimate the impact/reach of their food distribution/cash transfer (9,435), orphans relief support (7,600), nutrition education activities (2,739), feeding/management of severe acute malnourished children (949) activities. These findings strengthens the evidence that NGOs in developing countries are involved in the provision of health and nutrition services for their poor, vulnerable and marginalized groups (1,3)

Table 1. Profile/characteristics of the selected NGOS

Variables **Area of focus**	Freq (N =36)	Percentage
General nutrition	9	25.0
Maternal and u-5 child nutrition	6	16.7
Older children malnutrition	6	16.7
Orphan poverty and malnutrition	3	8.3
NCD prevention and management	4	11.2
Nutrition in rural areas/slums & food insecurity	4	11.2
Others	4	11.2
Size of the organization		
Less than 5	10	27.8
5-10	7	19.4
11-20	7	19.4
21-50	3	8.3
Above 50	9	25.0
Duration since inception		
1-5 years	23	63.9
6-10 years	7	19.5
>10 years	6	16.7
Primary source of funding		
Members contribution/self-funding	18	50.0
Donations from public	8	22.2
Funded by a bigger NGO	6	16.7
Industry support	1	2.8
Generate funds from other services rendered	3	8.3
Challenges faced		
Financial constraints	30	83.3
Poor commitment from members	3	8.3
Lack of interest from targeted beneficiaries	3	8.3
Medium of promoting impact visibility		
Capture highlights on social media	30	83.3
Media publicity	4	11.1
Release docmentaries/newsletters	2	5.6

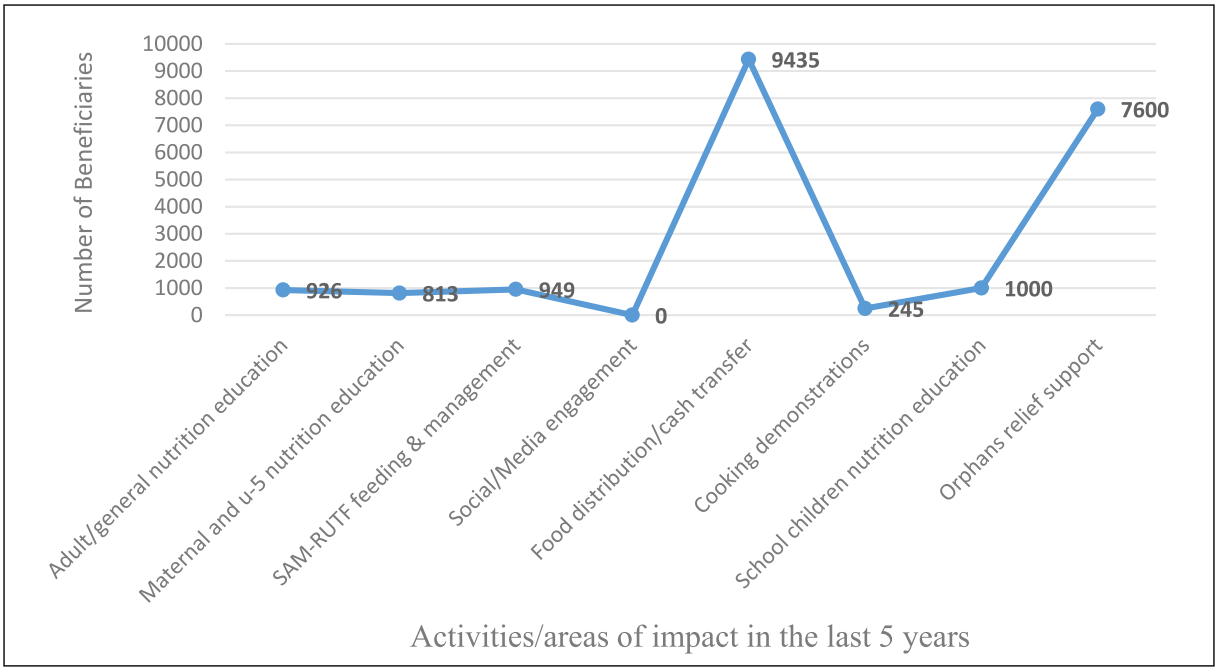

Fig 1: Estimated activities and beneficiaries of NGO's interventions over the past five years
*Beneficiaries of online/media nutrition engagement not captured

CONCLUSION

Grassroot/local NGOs has contributed immensely in the delivery of all aspect of nutrition goods. However poor funding, low visibility and less detailed documentation of their interventions was observed. There is need for government, bilateral agencies and industry support and collaboration with local NGOs to foster grass root development.

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PA5

Prospects And Challenges For The Development Of Sustainable Nutrition-sensitive Food Systems In Nigeria

Salisu Maiwada Abubakar
Nutrition Unit, Biochemistry Department and Africa Center of Excellence for Population Health and Policy, Bayero University, P. M. B. 3011, Kano – NigeriaNutrition Unit,
Biochemistry Department and Africa Center of Excellence for Population Health and Policy, Bayero University, P. M. B. 3011, Kano – Nigeria
smabubakar.bch@buk.edu.ng

KEYWORDS: Nutrition-sensitive, Food Systems, Healthy Diets, Sustainability.

BACKGROUND AND OBJECTIVES:
Achieving some of the global targets of reducing malnutrition in all its forms require concerted and coordinated efforts by all stakeholders. The contribution of food systems in ensuring afforadable and healthy diets has been well recognized and suggestions for transformation highlighted. However, there apprears to be slow progress in action towards transforming food systems for the deliveryof healthy diets in Nigeria. This study aimed to identify challenges hindering full integration of nutrition into food systems in Nigeria. In addition, prospects of nutrition-sensitive for healthy diets will be discussed.

MATERIAL AND METHODS
Relevant literature (1, 2) on food systems for healthy diets were reviewed. Information gathered was used to suggest potential challenges and prospects of transforming food systems for healthy diets in Nigeria. .

RESULTS AND DISCUSSION
Poor coordination and implementation of existing policies and strategies related to nutrition-sensitive food systems appears to be one of the greatest challenges of transforming food systems for healthy diets in Nigeria. In addition, all aspects (production, harvesting, processing, transportion, financing, marketing and consumption) of food sytems in Nigeria have been significantly and negetively affected by conflicts, insecurity and COVID-19 pandemic. These directly impacts food environment and livelihood assets with consequent severe disruption and restriction of food systems leading to limited availability and difficulty to afford adequate nutritious foods. However, abundance of human and material resources coupled with renewed efforts of Government to ensure adequate security, conflicts resolution and empowerment programmes among others presents a great opportunity to revolutionise and transform food systems in Nigeria for the provision of adequate and affordable healthy diets to Nigerians. Table 1 summarises some strengths, weaknesses, opportunities and threats to the realization of sustainable and nutrition-sensitive food systems in Nigeria.

Table 1. Some strengths, weaknesses, opportunities and threats to the transformation of food systems for healthy diets in Nigeria

Strengths	Weaknesses
• Abundance of arable land • Presence of capable private sector • Abundant water resources • Existence of relevant government policies and strategies	• Seasonal food production • Poor coordination and implementation of relevant policies and strategies • Postharvest losses • Poor agricultural mechanisation
Threats	**Opportunities**
• Climate variability • Conflicts/insecurity • Corruption • Pandemic like COVID-19	• Availability of technology for improved agricultural inputs • Renewed interest of government to ensure enough and quality food production • Disposition of international and local partners

Source: Author of the abstract.

CONCLUSION AND RECOMMENDATION:

Feeding a country with over 200 million citizens with healthy diets require concerted and coordinated effort by all stakeholders to ensure a sustainable and nutrition-sensitive food systems. This can be achieved by mitigating identified threats, taking advantage of the strengths and leveraging on the opportunities identified.

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Pb1

Effects of Different Processing Methods on Proximate, Phytochemical and Mineral Composition of Lima Bean Flour (*phaseolus Lunatus*)

***Ifeanacho, M.O[1].,Ogbonnaya,E.A[2]. and Nnawulezi, C.J[2].**

[1]*Department of Food, Nutrition and Home Science, Faculty of Agriculture, University of Port Harcourt, Choba, Rivers State, Nigeria.*

[2]*Department of Biochemistry, University of Port Harcourt, Choba, Rivers State, Nigeria*

mifeanacho@yahoo.com

KEYWORDS: Washed, Dehulled, Roasted, Limabean, Nutrients, Phytochemicals.

BACKGROUND AND OBJECTIVE:

Lima beans *Phaseolus lunatus* is a lesser-known legume in Nigeria.It is known to have a good nutritional profile. The legume, however, possesses some unique characteristics. Among these characteristics are long cooking period, very bitter taste when boiled and the presence of certain detrimental phytochemicals. These have necessitated the use of some traditional methods in its processing before consumption. However, the use of these processing methods in turn have raised concerns among researchers with respect to retention of the inherent nutrients in the legume as well as the rate of reduction of the detrimental phytochemicals in the legume. This study therefore investigated the effect of some domestic processing methods on the aforementioned inherent potentials and the detrimental phytochemicals in the legume.

MATERIALS AND METHODS:

RThe beans were purchased from a local market in Ezira, Anambra state, Nigeria. They were sorted for extraneous materials, washed and divided into six portions of 200g each which were used in the study. The first group was not processed(Raw-R).The remaining five groups were each processed differently.The first group of the treated group(cooked washed-CW) which was the second group of the experimental groups was cooked until soft. It was washed severally to remove the bitterness. Subsequently, cooking resumed until the beans became relatively mashy. The third group (cooked unwashed-CU) was cooked continuously until it became relatively mashy. The forth group (soaked dehulled-SD) was soaked in cold water and had the hull removed. Fifth (soaked dehulled roasted-SDR) and the sixth (soaked dehulled cooked) groups were dehulled roasted and cooked respectively.The seventh group was only dehulled after soaking.The individual groups were milled into fine flour and analyzed for proximate, minerals and phytochemical composition. The proximate components were determined by AOAC Official Methods and Carbohydrate was determined by difference.

RESULT AND DISCUSSION:

The raw lima beans(R) had the lowest moisture content (12.48±0.20 %) which was statistically different($P<0.05$)fromother groups. Lipids (7.00±0.00%) and ash (6.54±0.28%) were highest in the hull which were statistically different($P<0.05$).from the other groups. Protein was highest in the

soakeddehulled(SD) (26.03±0.13%) but not statistically different from the other groups except the hull (10.50± 0.25%). Carbohydrate was highest in the soaked dehulledcooked(SDC) (81.67± 0.20%) and lowest in the hull(H)(38.65±0.20%) while fibre was highest in the hull (37.32±0.23%) as expected and statistically different from the rest of the group. This is because hulls are potentially rich in fiber ranging from 75-89% (1).The soakeddehulled had the highest potassium(214.97±0.58) and zinc content (2.55± 0.01 mg/100g) statistically different (P<0.05).from other groups. Cookedunwashed(CU) had the highest iron content(3.22± 0.01mg/100g) followed by the hull.The presence of these nutrients in the hull suggests that the hull could be put into use in animal or even human nutrition. The phytochemical results (mg/100g) presented in Table 1 showed that the hull(524.25±13.13) had the highest tannin value which was statistically different(P<0.05).from all other groups. Alkaloids are highest in the raw (74.90±2.60) and unwashed which are statistically different from others.The employed processing methods therefore reduced the alkaloids and consequently the bitterness (2,3). The same for phenols with the highest values in the hull(181.82± 0.36mg/100g) and cooked unwashed (133.08±0.00) (4,5).

TABLE1.PHYTOCHEMICALCOMPOSITIONOF*P. lunatus*(mg/100g).

Sample	Tannis	Alkaloids	Flavonoids	Phytate	Saponnis	Cyanogenic _glycoside	Phenols(x10^3)
R	141.50±0.29^a	74.90±2.60^a	40.05± 0.03^a	16.65±0.64^a	15.50±0.00^a	20.00±0.00^a	67.79±0.54^a
CW	51.25±2.45^b	30.50±2.25^b	28.40±0.00^b	7.77±1.28^b	9.00±0.00^b	20.00±0.00^a	12.808±0.90^a
CU	72.25±0.43^b	67.80±2.42^a	20.65±0.03^b	2.78±0.32^b	30.40±0.00^a	360.00±23.09^c	133.08±0.00^b
SD	63.00±0.58^b	47.40±1.39^b	35.90±0.00^b	1.43±0.32^b	5.05±0.03^b	12.00±0.00^a	72.16±0.90^a
SDR	74.75±0.43^b	36.60±0.35^b	33.85±1.18^b	1.11±0.00^b	36.05±0.03^b	560.00±0.00^c	87.47±1.08^b
SDC	50.75±1.01^b	31.50±1.79^b	27.35±0.03^b	5.55±0.64^b	18.00±0.00^b	38.00±1.15^a	48.42±1.98^a
H	524.25±13.13^c	52.20±3.12^b	8.25±0.03^b	16.66±0.00^a	32.00±0.00^b	32.00±0.00^a	181.82±0.36^b

Values are means ±Standard deviation Mean (SEM) of triplicate samples. Values in same column with different superscript are statistically differentat (P<0.05).

LEGEND:
R-Raw,CW-Cooked washed,CU-Cooked unwashed,SD-Soaked dehulled,SDR-Soaked dehulled roasted, SDC-Soaked dehulled cooked,H-The hull.

CONCLUSION AND RECOMMENDATION

Results showed that some of the processing methods particularly cooked washed (CW) reduced the levels of tannin, alkaloids, phytate and saponin significantly in the test legume.Some of the analyzed minerals were increased by the processing methods.In addition, the legume hull was observed to be relatively rich in some nutrients.It is therefore recommended that the hull should be investigated for possible use in animal nutrition or even human nutrition for overall wellbeing.

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OB2

Micronutrient And Anti-nutrient Composition Of Red Kidney Beans (*phaseolus Vulgaris*) As Influenced By Traditional Processing Methods

Ani, P. N* & Ibeanu, V. N.
Department of Nutrition and Dietetics,
University of Nigeria, Nsukka. Enugu State, Nigeria
peace.ani@unn.edu.ng

KEYWORDS: Red Kidney Beans, Underutilized, Processing Methods, Nutrient.

BACKGROUND AND OBJECTIVE:
Legume is mainly the food source of protein widely affordable in our locality; however, many are underutilized due to a number of limiting factors. Presence of anti-nutritional factors and long cooking time are among the major limiting factors of underutilized legumes. Anti-nutritional factors are defense metabolites commonly synthesized by plants as part of protection against attack by herbivores, insects and pathogens or as means of survival in adverse growing conditions (1). Anti-nutritional factors such as tannins, phytates, hemagglutinnins and cyanide cause decreased protein digestibility and reduced absorption of divalent metals such as iron and zinc (2). This study sought to determine the micronutrient and anti-nutrient composition of red kidney beans (*Phaseolus vulgaris*) as influenced by traditional processing methods.

MATERIALS AND METHODS:
Red kidney beans, salt and potash were purchased from a local market in Nsukka, Enugu State. The legume was sorted and divided into five portions of 1kg each. One portion was the control and did not undergo any form of processing. The second portion (BB) was washed in distilled water, drained and boiled at 100°C until soft. The third portion (SBB) was washed, drained and soaked in distilled water (1:3) for 12 hours at ambient temperature, after which it was boiled at 100°C until soft. The fourth portion (BSB) was washed, drained and boiled (100°C) with 20g of salt until soft. The last portion (BPB) was washed, drained and boiled (100°C) with 10g of potash until soft. The cooking time of each sample was recorded. The samples were chemicallyevaluatedand data obtained were analyzed using Statistical Product for Service Solution, version 23. Significance was set at $p < 0.05$.

RESULT AND DISCUSSION:

The processing methods had significant ($p < 0.001$) effects on both vitamin and mineral composition of the red kidney beans. The control had significantly higher vitamin and mineral content than the processed samples except for iron content which was improved by soaking [Table 1]. The traditional processing methods employed significantly ($p < 0.001$) reduced the anti-nutrient content of the red kidney beans [Table 2]. This finding is in line with several other studies which found that anti-nutrient content of legumes could be reduced through soaking and addition of additives such as potash and salt (3).

Table 1: Vitamin and mineral composition (mg/100g) of raw and processed red kidney beans

Samples	Thiamin	Riboflavin	Niacin	Iron	Magnesium	Zinc	Potassium
Raw (control)	0.35 ± 0.01^{e}	0.14 ± 0.01^{d}	5.35 ± 0.01^{c}	5.26 ± 0.01^{d}	125.26 ± 0.01^{e}	1.85 ± 0.01^{e}	1332.26 ± 0.01^{e}
Boiled (BB)	0.26 ± 0.01^{d}	0.06 ± 0.01^{a}	1.15 ± 0.01^{b}	4.19 ± 0.01^{a}	105.26 ± 0.01^{d}	1.06 ± 0.01^{d}	965.60 ± 0.02^{d}
Soaked & boiled (SBB)	0.18 ± 0.01^{b}	0.07 ± 0.00^{b}	1.13 ± 0.01^{a}	5.37 ± 0.01^{e}	93.36 ± 0.01^{c}	0.59 ± 0.01^{c}	635.36 ± 0.01^{b}
Boiled with salt (BSB)	0.23 ± 0.01^{c}	0.08 ± 0.01^{c}	1.12 ± 0.01^{a}	4.21 ± 0.14^{b}	92.26 ± 0.01^{b}	0.55 ± 0.01^{b}	650.25 ± 0.01^{c}
Boiled with potash (BPB)	0.14 ± 0.00^{a}	0.06 ± 0.00^{ab}	1.15 ± 0.01^{b}	4.83 ± 0.55^{c}	89.66 ± 0.01^{a}	0.46 ± 0.01^{a}	558.59 ± 0.01^{a}

Mean values in the same column with different superscripts are significantly different at $p < 0.05$

Table 2: Anti-nutrient composition (mg/100g) of raw and processed red kidney beans

Samples	Phytate	Oxalate	Tannins
Raw **(control)**	12.26 ± 0.01^{d}	2.79 ± 0.01^{e}	3.26 ± 0.01^{d}
Boiled **(BB)**	5.36 ± 0.01^{b}	0.25 ± 0.00^{c}	0.15 ± 0.00^{c}
Soaked & boiled **(SBB)**	4.64 ± 0.01^{a}	0.19 ± 0.01^{b}	0.11 ± 0.01^{b}
Boiled with salt **(BSB)**	6.36 ± 0.01^{c}	0.34 ± 0.01^{d}	0.06 ± 0.00^{a}
Boiled with potash **(BPB)**	5.36 ± 0.01^{b}	0.16 ± 0.01^{a}	0.12 ± 0.00^{b}

Mean values in the same column with different superscripts are significantly different at $p < 0.05$

CONCLUSION AND RECOMMENDATİON:

Iron content of red kidney beanswasimproved by soaking and boiling with additives such as salt and potash while boiling alone increased the thiamin, magnesium, zinc and potassium content. Soaking before boiling was highly effective in reducing the anti-nutrients and should be utilized for optimal nutrition and health.

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OB4

Carbamate Pesticide Residue Levels In Beans (*Vigna Unguiculata*) From Depot Markets In Enugu State

Nsofor L.D. & Ngwu E.K.
Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State
laura.nsofor@unn.edu.ng

KEYWORDS: Pesticides, Carbamate, Beans, Maximum Residue Level

BACKGROUND AND OBJECTIVE:
Pesticides are toxic chemical materials or a mixture of substances that are purposely released into the environment in order to ward off, prevent, control and/or kill population of insects, weeds, rodents, fungi and other harmful pests (1). The presence of pesticide residues in various food commodities is a major food safety challenge (2). The application of carbamate pesticides though one of the best options of pest control in modern agriculture is increasingly becoming an issue of environmental concern due to its harmful effects (3). This study determined the carbamate pesticide residue levels in beans (*Vigna unguiculata*) from depot markets in Enugu State.

MATERIALS AND METHODS:
The bean samples were obtained from three beans depot markets in Enugu State Nigeria (Orie Orba (OOA), Orie Igboeze (OIE) and Ogbete Main Market (OGB)). The bean samples from each market were separately sorted and homogenized to represent three samples. They were each subjected to pesticide analysis using gas chromatography. Statistical analysis was done using IBM SPSS Statistics version 21. Analysis of variance and Duncan's New Multiple Range Test were used to separate the means. Significance was accepted at $P < 0.05$.

RESULTS AND DISCUSSION: The results as presented in figure 1 showed that the carbamate pesticide residues present in the beans samples were carbaryl (0.060 to 0.112 μg/Kg), propoxur (0.179 to 0.184 μg/Kg), carbofuran (0.172 to 0.176 μg/Kg), methiocarb (0.076 to 0.079 μg/Kg), pirimicarb (0.019 to 0.021 μg/Kg) and oxamyl (0.089 to 0.092 μg/Kg). Carbaryl level in OOA (0.112 μg/Kg) was significantly ($p<0.05$) higher than the rest. Pirimicarb level in OGB (0.019 μg/Kg) was significantly ($p<0.05$) lower than the rest. The pesticide residue levels detected in this study were lower than those in maize grains purchased from Lagos State (4). This could be because they are different food crops and differences in the area of sample collection.

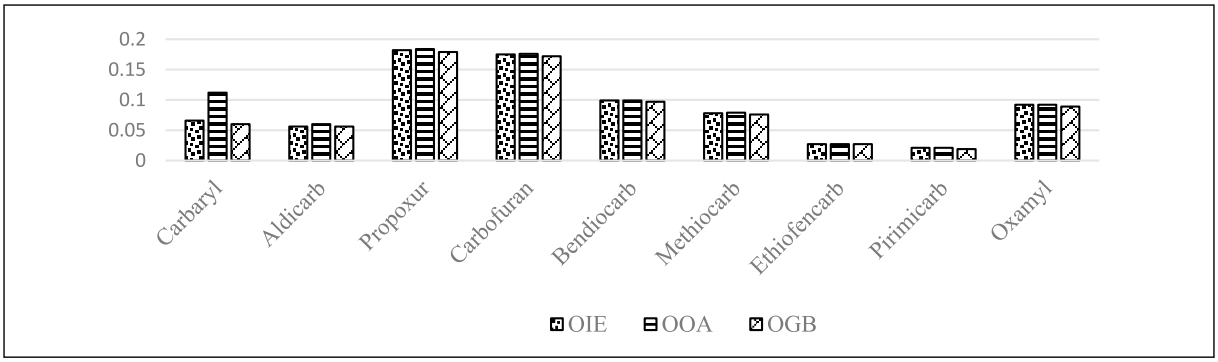

Figure 1: Carbamate levels (μg/Kg) of beans samples from different beans depot markets in Enugu State

KEYS:
OIE = Beans sample from Orie Igboeze market in Enugu State
OOA = Beans sample from Orie Orba market in Enugu State
OGB = Beans sample from Ogbete Main Market in Enugu State

CONCLUSION AND RECOMMENDATION:

The beans samples from the markets had similar values for most of the pesticide residues. Regular monitoring and evaluation of pesticide residues in foods is recommended to ensure that foods are safe for consumption.

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PB5

Effect of Processing on Nutritional Properties of Detarium Macrocarpum Seed Flour

***Boniface B. Y[1]., Nzelibe H.C[1] and Sallau A. B[1]**
Department of Biochemistry, Ahmadu Bello University Zaria, Nigeria.
iveren2016@gmail.com

KEYWORDS: Detarium macrocarpum, Processing, Proximates, Nutrient

BACKGROUND AND OBJECTIVE:
Detarium macrocarpum (Taura), is a tree legume whose seed is edible and contain some phytochemical properties, minerals and anti-nutrients (1). It also has ethno-medicinal and pharmacological uses and is used as a food stabilizer, soup thickener and in the traditional cosmetic industries.
Despite its high nutritive properties and abundance, its utilization as food ingredient is limited due to the presence of anti-nutritional factors and lack of concise nutritional information (2). More so, due to the difficulty in seed coat removal and grinding of seed into flour, some processes are carried out to aid the removal of the seed coat. These processes either improve or affect the nutrient content of the seeds which might lead to deficiency of the nutrients thereby causing malnutrition. This study aimed at studying the effect of processing on proximate composition, micronutrient and anti-nutrient content of *Detarium macrocarpum* seed flour

MATERIALS AND METHODS:
D. macrocarpum seed was obtained from Sabo market, Zaria in Kaduna state and identified. The seeds were divided into 5 equal portions, and four portions were each soaked, roasted, fermented and autoclaved respectively while the remaining portion which was not processed served as the control.
Thereafter, seeds were dehulled, oven-dried, grinded, sieved and packaged as *D. macrocarpum* seed flour. The samples were subjected to proximate, micronutrient and anti-nutrient using standard analytical methods. The data obtained were analyzed using SPSS version 20.

RESULTS AND DISCUSSION:
The results as presented in Table 1 showed the effect of processing on the *D. macrocarpum* seed flour. The decrease in moisture content showed that it could be stored for long without fear of deterioration. More so, the significant decrease in lipid content of the processed seed flour could be as a result of leaching or diffusion of soluble fats into the water. The crude fiber and carbohydrate content of the processed seed flour were significantly ($p \leq 0.05$) increased due to the processes involved which reduced the other components as a result of denaturation and leaching, leading to their increase (3) while the increase in some of the micronutrients might be as a result of the decrease in anti-nutrient during processing thus improving their availability.

Parameters		Processed			
	Raw	Soaked	Fermented	Roasted	Autoclaved
Moisture content (%)	7.65 ± 0.25^{c}	5.33 ± 0.23^{ab}	5.90 ± 0.20^{b}	4.85 ± 0.01^{a}	7.85 ± 0.30^{c}
Ash content (%)	2.28 ± 0.13^{c}	0.88 ± 0.13^{a}	1.82 ± 0.06^{b}	2.68 ± 0.13^{d}	4.35 ± 0.05^{e}
Lipid content (%)	22.95 ± 0.45^{e}	20.90 ± 0.04^{c}	18.40 ± 0.20^{a}	19.35 ± 0.05^{b}	20.30 ± 0.10^{c}
Protein (%)	10.50 ± 0.01^{b}	13.13 ± 0.88^{c}	14.00 ± 0.01^{c}	10.51 ± 0.01^{b}	8.75 ± 0.01^{a}
Crude fibre (%)	1.75 ± 0.10^{a}	2.48 ± 0.03^{b}	$2.53\pm0.03b^{c}$	2.68 ± 0.13^{c}	3.03 ± 0.03^{d}
Carbohydrate (%)	56.63 ± 0.83^{a}	$59.78\pm0.1.63^{b}$	59.90 ± 0.05^{b}	62.63 ± 0.08^{c}	58.75 ± 0.35^{ab}
Calcium (mg/100g)	4.58 ± 0.72^{ab}	5.19 ± 0.92^{b}	4.61 ± 0.25^{ab}	4.36 ± 0.18^{a}	3.22 ± 0.23^{a}
Magnesium (mg/100g)	13.3 ± 0.34^{b}	12.37 ± 0.59^{b}	13.03 ± 0.06^{b}	12.56 ± 0.23^{b}	11.14 ± 0.38^{a}
Potassium (mg/100g)	44.79 ± 1.11^{c}	36.75 ± 1.27^{a}	47.75 ± 0.59^{d}	51.25 ± 0.90^{e}	40.25 ± 1.38^{b}
Iron (mg/100g)	7.18 ± 1.45^{ab}	5.68 ± 1.13^{a}	7.74 ± 0.30^{ab}	11.64 ± 0.68^{c}	9.13 ± 0.34^{b}
Zinc (mg/100g)	0.38 ± 0.03^{ab}	0.17 ± 0.06^{a}	0.15 ± 0.04^{a}	0.46 ± 0.18^{b}	0.38 ± 0.08^{ab}
Phosphorus (mg/100g)	56.43 ± 0.40^{c}	70.05 ± 1.49^{d}	36.52 ± 0.91^{b}	30.22 ± 1.20^{a}	35.77 ± 1.52^{b}
Provitamin A (mg/100g)	3.76 ± 0.04^{b}	6.19 ± 0.02^{c}	4.02 ± 0.03^{c}	4.65 ± 0.04^{d}	4.15 ± 0.04^{a}
Vitamin C (mg/100g)	0.17 ± 0.03^{c}	0.19 ± 0.03^{a}	0.15 ± 0.03^{e}	0.10 ± 0.03^{d}	0.32 ± 0.03^{b}
Vitamin E (mg/100g)	5.15 ± 0.04^{ab}	1.07 ± 0.03^{b}	10.34 ± 0.03^{ab}	5.75 ± 0.04^{a}	4.51 ± 0.03^{c}
Tannin (mg/100g)	1.20 ± 0.15^{b}	1.30 ± 0.15^{b}	1.00 ± 0.15^{b}	1.05 ± 0.15^{b}	0.55 ± 0.10^{a}
Phytate (mg/100g)	0.09 ± 0.01^{b}	0.09 ± 0.02^{b}	0.07 ± 0.01^{a}	0.04 ± 0.01^{a}	0.09 ± 0.01^{b}
Saponin (mg/100g)	28.85 ± 2.12^{b}	24.70 ± 2.06^{ab}	20.25 ± 1.99^{a}	0.42 ± 1.99^{a}	24.40 ± 2.30^{ab}
Oxalate (mg/100g)	0.23 ± 0.05^{b}	0.06 ± 0.02^{a}	0.04 ± 0.01^{a}	0.04 ± 0.02^{a}	0.04 ± 0.01^{a}
Trypsin (mg/100g)	15.03 ± 0.61^{e}	13.21 ± 0.31^{d}	11.09 ± 0.32^{c}	8.06 ± 0.00^{b}	6.14 ± 0.35^{a}

*values are means of triplicate result ± standard deviation.
*values followed by different superscripts in the same row are significantly different ($P \leq 0.05$).

CONCLUSION AND RECOMMENDATION

D. macrocarpum seed flour is a good source of micronutrient, carbohydrate and fibre while processing helps to improve its nutrient, reduced anti-nutrient and extend shelf life. It can be used as supplement in food and animal feed.

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OB8

Effect of Processing Methods on the Cooking Time, Proximate and Metabolizable Energy Value of Red Kidney Beans (*Phaseolus vulgaris*)

[1]Ani, P. N*. [2]Umerah, N. N., [1]Eze, S. N. & [1]Nwanga, J. T.
[1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka. Enugu State, Nigeria.
[2]Department of Food Science and Technology, Enugu State University of Science and Technology, P.M.B. 01660, Enugu, Nigeria.
peace.ani@unn.edu.ng

KEYWORDS: Legume, Underutilized, Processing Methods, Nutrient.

BACKGROUND AND OBJECTIVE:
The high cost of animal sources of protein in most developing countries makes consumption of animal produce in many households almost impossible due to poor economic security (1). This affects the adequacy of food consumption as the cheaper sources of protein such as legumes become the major protein supply. However, due to the high cost of fuel, reduction of cooking time is a priority in many Nigeria households. Many underutilized legumes including red kidney beans have long cooking time which has greatly contributed to their limited utilization. This study determined the effect of different processing methods on the cooking time, proximate and energy value of red kidney beans.

MATERIALS AND METHODS:
The red kidney beans, salt and potash were purchased from Ogige market in Nsukka, Enugu State. The beans were sorted and divided into five portions of 1kg each. One portion was not subjected to any form of processing (control). The second portion (BB) was washed in distil water, drained and boiled at 100°C until soft. The third portion (SBB) was washed, drained and soaked in distilled water (1:3) for 12 hours at ambient temperature, after which it was boiled at 100°C until soft. The fourth portion (BSB) was washed, drained and boiled (100°C) with 20g of salt until soft. The last portion (BPB) was washed, drained and boiled (100°C) with 10g of potash until soft. The cooking time of the samples were recorded. The proximate composition was analyzed and the metabolizable energy value was calculated. Data obtained were analyzed using Statistical Product for Service Solution, version 23. Significance was set at $p < 0.05$.

RESULT AND DISCUSSION:
The raw sample had the highest composition of proximate and energy value except for moisture. The processing methods significantly ($p < 0.001$) reduced the proximate composition and metabolizable energy value of the legume. This finding is contrary to the result of Audu et al. (2) that boiling improved the ash, fat, protein and energy content of *Phaseolus vulgaris*. The protein content in the present study was mostly improved by soaking before boiling and boiling with additives. The sample boiled with potash (BPB) had the least

Table 1: Proximate composition (%/100g) and metabolizable energy value of raw and processed red kidney beans

Samples	Protein	Fat	Ash	Crude fibre	Moisture	Carbohydrate	*Energy
Raw (control)	22.36±0.01^{e}	1.85±0.01^{e}	3.46±0.01^{c}	5.37±0.01^{e}	9.56±0.01^{a}	57.41±0.04^{e}	346.41±0.16^{e}
Boiled (BB)	16.66±0.01^{a}	1.36±0.01^{d}	2.64±0.01^{a}	3.37±0.01^{d}	63.35±0.00^{c}	12.64±0.04^{d}	136.11±0.01^{c}
Soaked & boiled(SBB)	18.57±0.03^{d}	1.23±0.01^{b}	2.69±0.01^{b}	3.18±0.01^{b}	62.56±0.01^{b}	11.79±0.05^{c}	138.80±0.04^{d}
Boiled with salt (BSB)	17.27±0.03^{b}	1.31±0.03^{c}	2.67±0.01^{b}	3.27±0.03^{c}	64.57±0.01^{d}	10.91±0.03^{b}	131.05±0.20^{b}
Boiled with potash (BPB)	17.49±0.01^{c}	1.07±0.01^{a}	2.69±0.01^{b}	2.59±0.01^{a}	66.66±0.01^{e}	9.52±0.02^{a}	122.80±0.17^{a}

Mean values in the same column with different superscripts are significantly different at $p < 0.05$

composition of fat (1.07%), crude fibre (2.59%) and carbohydrate (9.52%) but highest composition of moisture (66.6%) [Table 1]. The cooking time was reduced by 52%, 14% and 29% when soaked and boiled (SBB), boiled with salt (BSB) and boiled with potash, respectively compared to boiling only (BB) [Fig. 1].

*Calculated metabolizable energy (kcal) = (Protein × 4 + Fat × 9 + Fibre × 2 + Carbohydrate × 4)

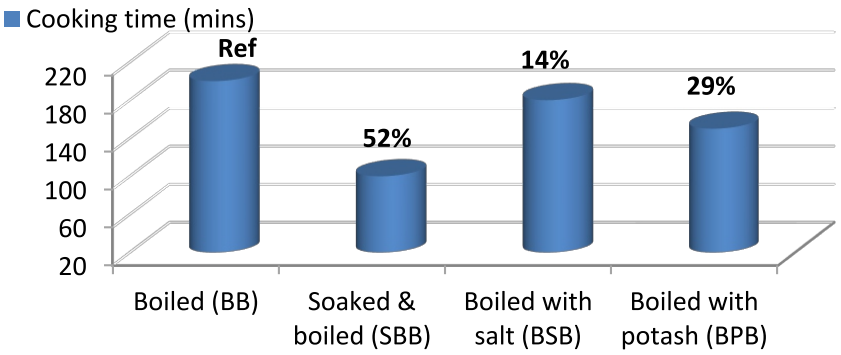

Fig 1: Cooking time (mins) of processed red kidney beans

CONCLUSION AND RECOMMENDATİON:

Soaking for 12 hours is a very effective means of reducing cooking time of red kidney beans. Soaking for 12 hours before boiling also improved the fat, crude fibre and carbohydrate content of red kidney beans more than other methods. Hence, this processing method is highly recommended.

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OB9

Diet Quality And Anthropometric Status Of Children Living with Hiv/aids (8-19 Years)

Akinbule, O.O.[1], Aofolaju, O.M.[1], Olurin, T.K., Kareem, S.T.[2] and Ademuyiwa, M.O.[3]
[1]Federal University of Agriculture Abeokuta; [2]Federal Teaching Hospital, Gombe [3]State Hospital, Ijaiye, Abeokuta
opeyemiegr8king@gmail.com

KEYWORDS: Diet Quality, Malnutrition, Children Living With Hiv/aids, Bmi-for-age

BACKGROUND AND OBJECTIVE:

Malnutrition is a public health problem particularly among children living with HIV/AIDS leading to increased mortality rate among this population (Ezinna et al., 2019). The quality of diet consumed by this population group may play a significant role in reducing the burden of malnutrition, strengthening their

immune system and thereby reduce morbidity and mortality rate among children living with HIV/AIDS (Martín-Cañavate *et al.*, 2018). This study assessed the diet quality and anthropometric status of children living with HIV/AIDS in Abeokuta.

MATERIALS AND METHODS:

A case-control study of 210 children (105 living with HIV/AIDS and 105 living negative) within ages 8-19 years, who were receiving treatment at State Hospital, Sokenu, Ijaiye, Abeokuta was conducted using a simple random sampling technique. Respondents' dietary intake was assessed using 24-hour dietary recall and converted to nutrient intake using the Total Diet Assessment software. Diet quality was determined by comparing respondents' intake with the optimum intake of the Global Burden of Diseases Dietary Risk Factors and Estimated Average Requirement. Respondents' anthropometry were measured using standard procedures and WHO anthro plus was used to determine the prevalence of malnutrition among respondents. Pearson's Chi-square and t-test was used to test for association and significant difference among variables at $p<0.05$.

RESULT AND DISCUSSION:

There were significant ($p<0.05$) differences between the intakes of vegetables ($p=0.00$), nuts and seeds ($p=0.04$), SSBs ($p=0.01$), dietary fibre ($p=0.04$) and calcium ($p=0.00$) among respondents with cases and control. About 96.0%, 20.6% and 16.7% children living with HIV/AIDS within the age-range of 8-12, 13-18 and 19 years were overweight. Also, there is significant difference between the BMI-for-age of cases and control within the age-range of 8-12 years and 13-18 years.

Table 1: Diet quality and anthropometric status of children living with HIV/AIDS

			Diet quality			
S/N	**Intake of food groups/nutrients**	**Optimal Intake**	**Case** Mean Intake (%)	**Control** Mean Intake (%)	t-score	P value
1	Fruits	250 g	1.74(0.70)	1.90 (0.76)	-0.07	0.95
2	Vegetables	360 g	78.76 (21.88)	115.43 (32.06)	-0.07	0.00*
3	Legumes	60 g	85.52(142.54)	107.98 (179.97)	-3.21	0.18
4	Whole grains	125 g	30.64 (24.51)	35.27 (28.22)	-3.21	0.10
5	Nut and seed	21 g	1.80(8.57)	1.60 (1.37)	-1.36	0.04*
6	Milk	435 g	4.88 (1.12)	6.24 (1.43)	-1.36	0.68
7	Red meat	23g	8.27 (35.94)	15.50 (67.41)	-1.68	0.10
8	Processed meat	2 g	0.95 (47.62)	0.00 (0.00)	-1.68	0.32
9	*Sugar sweetened beverages	3g	50.04 (167.94)	13.33 (444.4)	2.00	0.01*
10	Dietary fibre	24 g	2(8.33)	10.12 (42.18)	2.00	0.04*
11	Calcium	1.25g	0.2 (16.00)	1.21 (96.8)	-0.02	0.00*

Body mass index for age of children living with HIV/AIDS

Age		Case	Control	Total	P-value
8-12 yrs.	Thinness	0 (0.0)	0 (0.0)	0 (0.0)	0.00*
	Severe thinness	1 (4.0)	0 (0.0)	1 (2.0)	
	Underweight	24 (96.0)	0 (0.0)	24 (48.0)	
	Normal	0 (0.0)	25 (100.0)	25 (50.0)	
	Total	25 (100.0)	25 (100.0)	50 (100.0)	
13 - 18 yrs.	Thinness	0 (0.0)	1 (1.4)	1 (0.7)	0.00*
	Severe thinness	0 (0.0)	0 (0.0)	0 (0.0)	
	Underweight	14 (20.6)	0 (0.0)	14 (10.0)	
	Normal	54 (79.4)	71 (98.6)	125 (89.3)	
	Total	68 (100.0)	72 (100.0)	140 (100.0)	
19 yrs.	Thinness	0 (0.0)	1 (12.5)	1 (5.0)	0.24
	Severe thinness	0 (0.0)	0 (0.0)	0 (0.0)	
	Underweight	2 (16.7)	0 (0.0)	2 (10.0)	
	Normal	10 (83.3)	7 (87.5)	17 (85.0)	
	Total	12 (100.0)	8 (100.0)	20 (100.0)	

*with ≥50 kcal per 226.8 serving,

CONCLUSION AND RECOMMENDATIONS

Respondents with cases had higher intakes of most food groups compared to the control with significant differences in their vegetable, nuts and seeds, sugar sweetened beverages, dietary fibre and calcium intakes. Malnutrition is more prevalent in respondents with cases when compared to control.

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OB10

Physicochemical And Microbiological Assessment Of Garri Sold In Open Markets In The Three Senatorial Districts Of Cross River State, Nigeria.

AGIANG, M. A. and OHAM, O.A
Department of Biochemistry, University of Calabar, Nigeria.
margaretagiang@yahoo.co.uk, ruthoham3101@gmail.com

KEYWORDS: Garri, Microbilogical, Hydrogen Cyanide, Heavy Metal

BACKGROUND AND OBJECTIVE:
Garri is a basic staple food that is consumed by several millions of people in the West African sub-region and Nigeria in particular regardless of ethnicity and socio-economic class. The sale of garri in the local markets in Cross River State, Nigeria, is generally associated with practices such as open display in bowls, open buckets and mats at points of sale and the use of bare hands in handling and selling of garri products, which may predispose individuals to public health hazards. This study, therefore, sought to determine the chemical residues (heavy metals such as cadmium, chromium, lead and arsenic), hydrogen cyanide content, as well as assess the microbial load in garri sold in open markets in Cross River State, Nigeria.

MATERIALS AND METHODS:
A total of Twenty-seven (27) garri samples, three from each market in three locations of each of the 3 Senatorial

Table 1: Heavy metals and hydrogen cyanide content in garri samples

Senatorial District	HCN (mk/kg)	Lead (Pb) (mg/kg)	Chromium (Cr) (mg/kg)	Arsenic (As) (mg/kg)	Cadmium (Cd) (mg/kg)
South	19.12 ±0.66	0.06 ±0.01	0.21 ±0.02	0.04 ±0.01	0.05 ±0.01
Central	15.90 ±0.32*	0.06 ±0.01	0.28 ±0.05	0.03 ±0.01*	0.03 ±0.01*
North	16.92 ±0.63*	0.06 ±0.01	0.17 ±0.01[a]	0.04 ±0.01[a]	0.04 ±0.01*,[a]
WHO/FAO permissible limits	10 mg HCN/kg body weight	0.20	0.10	0.20	0.20
Codex tolerable limits	----	0.1 – 1.5	----	----	0.05 – 1.0

Senatorial district	TAPC ($x10^3$ cfu/g)	Coliform count ($x10^2$ cfu/g)	Fungal count ($x10^2$ cfu/g)	ICMFS Standards
South	4.33 ±0.22	4.56 ±0.57	4.03 ±0.42	$\leq 10^3$ - Acceptable 10^4 - 10^5 Tolerable $\geq 10^6$ Unacceptable
Central	7.97 ±1.03*	6.38 ±1.15	5.29 ±0.79	
North	6.53 ±0.83*	5.78 ±0.77	5.05 ±0.63	

* = significantly different from South at $p<0.05$

districts of Cross River State, Nigeria were randomly collected. Hydrogen cyanide content was determined using the method described by [1]. Heavy metal was determined using atomic absorption spectrophotometer (AAS) [2]. Characteristic bacteria and fungal isolates were identified based on colonial morphology, microscopy and biochemical tests [3] and microscopy with reference to standard atlas and keys [4]. The identities of coliforms and bacteria were confirmed using the identification aid outlined in Bergey's Manual for Determinative Bacteriology [4] and [5].

RESULT AND DISCUSSION:

Hydrogen cyanide and chromium content in all garri samples in this study were above the FAO/WHO recommended 10 mg HCN/kg and 0.10 mg/kg body weight respectively as the maximum safe intake of chemicals in food/feed for humans and animals. These differences may be attributed to poor processing methods, airborne emissions which may have contaminated the garri samples. The concentration of lead, Cadmium and Arsenic in this study were found to be lower than the Tolerable limits by FAO/WHO. The differences in values shown in the microbial counts may be attributed to differences in food safety adherence or personal hygiene by the marketers. The results revealed that coliform was present in almost all the garri samples signified poor sanitary conditions in the post-process handling of garri via food handlers/marketer and the environmental conditions of the markets.

CONCLUSION AND RECOMMENDATION

Results from this study show that chemical, environmental and microbial contaminants in market areas contribute considerably to the quality of garri sold in these markets. It is, therefore, recommended that a research on the effect of long-term consumption of garri sold in different markets in this study area should be conducted using Wistar rats.

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OB11

Biological Value and Net Protein Utilization of Formulated Diet from Processed Aerial Yam and Cowpea Composite Flours Fed on Adult Albino Rats

Chukwuemeka E.N[1]; Anoshirike C. O[2*]; Nnam M.N[2]; Chikwendu J.N[2]; Nwankwo R.N[1c]

[1] *Department of Home Economic; Federal College of Education Eha-Amufu Enugu State*

[2] *Department of Nutrition and Dietetics, University of Nigeria Nsukka.*

cyril.anoshirike@unn.edu.ng

KEYWORDS: Biological value; Net protein Utilization, Aerial Yam and Cowpea

BACKGROUND AND OBJECTIVE:

Animal protein is very expensive and unaffordable by large proportion of the middle and low socioeconomic component of the population. Making the consumption of animal source protein low, Aerial yam and cowpea are available and relatively affordable and provides a good source of protein to the diet. Fermentation and

germination are known to improve the protein quality but limited studies have not established the digestibility and bioavailability of amino acids of processed aerial yam and cowpea composite blends. Hence, this study evaluate the biological value and net protein utilization of formulated diet from processed aerial yam and cowpea composite flours fed on adult albino rats.

MATERIALS AND METHODS:

Aerial yam and cowpea was purchased from a local market in Enugu, Aerial and cowpeas were processed: germinated alone and combined germinated and fermented, all were sundried and milled into flour separately and labeled. Germinated Ariel yam and Cowpea flour were formulated in the ratio of 70:30 and 60:40 while germinated fermented aerial yam and cowpea flours were formulated in the same ratio of 70:30 and 60:40. All the composite flours were enriched with same quantity of oil and vitamins and minerals. An experimental study design of a total of twenty male adult albino rats weighing 100 – 200g were purchased from Faculty of Veterinary medicine. The rats were weighed, and group-housed (n=5/cage) and acclimatized for five days before being randomly assigned to treatment groups. After a five-day of acclimatization period, a few milligrams of carmine red were added to the four formulated diets and fed ad libitum to the four groups of rats, respectively to mark the beginning of first day of twelve-day of nitrogen balance study period, the colored faeces excreted by each rat fed on different diets were collected and kept until day twelve. Urine collected was sterilized with 0.09 N HCL to avoid growth of micro-flora that might alter nitrogen content of the urine. Urine and faeces were analysed for nitrogen content using micro-Kjeldohi method [1]. The data collected was analyzed using SPSS version 23. Statistical analysis was carried out using ANOVA and mean was separated using Duncan multiple range test. Statistical significant was accepted as $p<0.05$.

RESULT AND DISCUSSION:

The result shows that Diet A = Germinated aerial yam flours (GAY): Germinated Cowpea flours (GCP) 70:30 had the highest food intake (91.60g), Nitrogen intake (1.47g), digested N (0.97g), Retained N (0.8g) and Net protein Utilization (55.10) while Diet B = Germinated fermented aerial yam flours (GFAY) + Germinated fermented cowpea flours (GFCP) 70:30 had the highest biological value 94.94 % and Diet C = Germinated aerial yam flours (GAY): Germinated Cowpea flours (GCP) 60:40 had the highest Faecal N (1.005g) and Urinary N (0.321g). The formulated diet from germinated aerial yam and cowpea in the ratio of 70%:30% are more palatable which account for the highest intake and its protein is of high quality because of high digested N, Retained N and net protein utilization. This could be on account of germination and ratio of blending of aerial yam and cowpea used in the diet.

Table 1 Nitrogen ratios and Net protein utilization of formulated diets fed to adult rats.

Nitrogen ratios	A	B	C	D
	70:30	70:30	60:40	60:40
Food Intake (g)	91.60^{a}	88.40^{b}	90.40^{a}	88.80^{b}
Nitrogen intake (g)	1.47^{a}	1.41^{a}	1.45^{a}	1.42^{a}
Faecal N (g)	0.50*	0.62*	1.005*	0.93*
Digested N (g)	0.97^{a}	0.79^{b}	0.44^{c}	0.49^{c}
Urinary N (g)	0.16*	0.04*	0.321*	0.07*
Retained N (g)	0.8^{a}	0.75^{b}	0.12^{d}	0.42^{c}
Biological value (%)	83.5^{b}	94.94^{a}	27.27^{c}	85.71^{b}
Net protein utilization	55.10^{a}	53.20^{a}	8.55^{c}	29.58^{b}

A = Germinated aerial yam flours (GAY): Germinated Cowpea flours (GCP) 70:30

B = Germinated fermented aerial yam flours (GFAY) + Germinated fermented cowpea flours (GFCP) 70:30

C = Germinated aerial yam flours (GAY): Germinated Cowpea flours (GCP) 60:40

D = Germinated fermented aerial yam flours (GFAY) + Germinated fermented cowpea flours (GFCP) 60:40

CONCLUSION AND RECOMMENDATION:
The nutrient bioavailability of the processed foods was high as judged by the results of N balance, food intake, and digestibility, retentions of nitrogen and biological value and net protein utilization. Hence, protein quality of complementary food can improved by applying this processing methods and using of aerial yam and cowpea blend.

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OB12

Diet Quality Of Women Of Reproductive Age In Abia State, Nigeria

Nnabugwu, C.D., Sanusi, R.A.
International Institute of Tropical Agriculture, University of Ibadan
dorisnnabugwu@yahoo.com

KEYWORDS: Women Of Reproductive Age, Body Mass Index, Diet Quality.

BACKGROUND AND OBJECTIVE:
Optimal diet promotes good health, longevity and decreases the risk of diet-related chronic diseases (1). Many African diets are monotonous in nature, plant based and are often starchy staples which are poor in micronutrient thus could pass as poor quality diets (2). Consequently, the burden of malnutrition in Nigeria is rising and inadequate micronutrient intake remains high among the vulnerable groups especially women of reproductive age (WRA) who are usually the 'gatekeepers' for nutrition in households (3). Though the importance of nutritional status in health and productivity of WRA is known, a tool – Diet Quality Index International (DQI-I) which further describes the quality of diet and help users to readily identify aspects of the diet that most need improvement has limited information in Abia State (4). Thus, this study was designed to assess the diet quality of women of reproductive age in Abia State, Nigeria.

MATERIALS AND METHODS:
The study design was descriptive cross-sectional among 707 WRA aged 15-49 years from the three geopolitical zones of Abia state. The respondents were selected using a five-stage sampling techniques. Data were collected using a pre-tested, interviewer-administered questionnaire with in-built 24-hour dietary recall. A tool known as DQI-I was used to calculate the diet quality score which measured the four categories of diet quality; variety, adequacy, moderation and overall balance (4). Scores for each component were summarized in each of the four main categories, and the scores for all four categories were summed, resulting in the total DQI-I score, ranging from 0 to 100 (0 being the poorest and 100 being the highest possible score). The total DQI-I scores of < 60% reflect poor-quality diets.

Table 1: Mean anthropometric status of respondents

Variable	Mean
BMI (kg/m^2)	25.64±5.59
WHR	0.87±0.59

Table 2: Diet Quality Index-International (DQI-I) scores and components

Component	Score ranges (points)	Mean	SD	Minimum	Maximum
Overall variety	0-15	9.30	2.78	3	15
Within variety	0-5	1.61	1.32	0	5.00
Variety	**0-20**	**10.91**	**3.80**	**3**	**20.00**
Vegetable group	0-5	3.61	2.15	0	5
Fruit group	0-5	0.83	1.76	0	5
Fibre group	0-5	1.86	1.46	0	5
*R/G/T	0-5	4.97	0.31	0	5
Vitamin C	0-5	1.41	1.85	0	5
Iron	0-5	4.36	1.12	1	5
Calcium	0-5	2.51	1.44	1	5
Protein	0-5	4.24	1.06	1	5
Adequacy	**0-40**	**23.78**	**6.60**	**8**	**40**
Total fat	0-6	4.99	1.73	0	6
Saturated fat	0-6	5.69	1.16	0	6
Cholesterol	0-6	5.86	0.89	0	6
Sodium	0-6	5.72	1.12	0	6
Empty calorie	0-6	5.08	1.86	0	6
Moderation	**0-30**	**27.33**	**4.15**	**6**	**30**
Macronutrient ratio	0-6	1.34	2.00	0	6
Fatty acid ratio	0-4	0.98	1.66	0	4
Overall balance	**0-10**	**2.31**	**2.38**	**0**	**10**
Diet quality score	**0-100**	**64.38**	**11.11**	**23**	**94**

*R/T/G: Roots/Grains/Tubers

The study showed that the BMI of the women was slightly above the normal range of healthy BMI for adults. According to the criteria of Kim and his colleagues (4), total DQI-I scores of < 60% reflect poor-quality diets. The total DQI-I for the current study was 64.38% and this was slightly higher than the findings reported for USA and China (4), for the Mediterranean and for South-east Nigeria (5). This could be as a result of transit in time, since the three studies had been conducted for more than a decade, particularly, data for the women in Nigeria was collected between year 2010 to 2011. Invariably, this good DQI-I may demonstrate that urbanization in Abia state did not influence negatively on the women's eating pattern.

CONCLUSION AND RECOMMENDATION

The mean anthropometric indices reported in this study was higher than the reference standard. This would increase the risk of chronic non-communicable diseases, morbidity and mortality among the women in Abia state. Though the DQI-I was high, more than 50% of the respondents did not meet 50% of the recommendations of these components (overall balance and adequacy - fruit, fiber and vitamin C). Efforts should be intensified to promote healthy diet and lifestyle among WRA.

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OB13

Production And Evaluation of Breakfast Cereals from Blends of Maize(*Zea Mays*) and Pigeon Pea (*Cajanus Cajan*) Flour

K. J. Ndubuisi[a], *I. U.Nwajagu[b] and J. I. Okoye[a]
[a]*Department of Food Science and Technology, Enugu State University of Science and Technology, P. M. B. 01660, Enugu, Nigeria.*
[b]*Department of Biochemistry, Ahmadu Bello Unversity Zaria, Nigeria*
immanwajagu@gmail.com

KEYWORDS: Breakfast Cereals, Nutrient Composition, Sensory Properties, Maize Flour, Pigeon Pea Flour

BACKGROUND AND OBJECTIVE:

Breakfast cereal can be defined as a dry cereal which has been processed into different forms (Nkiru *et al*., 2019). In Nigeria, two categories of breakfast cereals are popular; the powdered mix and the manufactured ready-to-eat flaked cereals.

Maize (*Zea mays*) is a major raw material used for producing breakfast cereals (Nkiru *et al*., 2019). Maize is deficient in sulphur-containing amino acid lysine but rich in methionine and cysteine. The nutritionally important legume pigeon pea (*Cajanus cajan L*.) is rich in lysine, leucine, aspartic acid, glutamic acid and arginine and can provide complete essential amino acids when consumed with cereals (Ade-Omowaye *et al*. 2015). Therefore, this research work was design to evaluate the nutrient and sensory properties of breakfast cereals formulated from the blends of maize and pigeon pea flour at different graded levels.

MATERIALS AND METHODS:

Mature dried maize grains (*Zea mays*) and pigeon pea seeds (*Cajanus cajan*) used for the study were purchased from Eke Agbani Market, Enugu State, Nigeria. The maize grains were malted and grounded into flour according to the method of Ariahu*et al*., (2009). The pigeon pea seeds were prepared into flour according to the method of Akubor (2017). The malted maize and pigeon pea flour produced was then used to prepare breakfast cereals. The formulated breakfast cereal samples were analysed for proximate composition and mineral composition according to the method of AOAC (2010) respectively. The sensory properties of the formulated breakfast cereal samples were also analysed.

Table 1: Proximate composition (%) and Energy content (kJ/100g) of breakfast cereals formulated from blends of maize and pigeon pea flour

Parameter	A 100MF: 0PPF	B 90MF:10PPF	C 80MF:20PPF	D 70MF:30PPF	E 60MF:40PPF	F 50MMF:50PPF
Moisture	7.58± 2.04^{d}	8.26± 2.06^{a}	7.47± 2.04^{e}	7.69± 2.01^{c}	8.15± 2.04^{b}	7.67± 2.10^{c}
Ash	2.53± 2.11^{e}	2.86± 2.08^{c}	2.89± 2.10^{c}	3.16± 2.03^{b}	2.72± 2.37^{d}	3.52± 2.11^{a}
Crude fibre	2.40± 2.01^{f}	2.88± 2.10^{e}	2.90± 2.03^{d}	3.64±2.04^{c}	3.81± 2.12^{b}	4.15± 2.03^{a}
Fat	1.90± 2.14^{f}	2.29± 2.09^{e}	2.39± 2.12^{d}	2.54± 2.08^{c}	2.78± 2.04^{b}	3.54± 2.13^{a}
Protein	10.21± 2.04^{f}	12.57± 2.16^{e}	13.79± 2.10^{d}	14.58±2.15^{c}	15.72± 2.23^{b}	16.45± 2.18^{a}
Carbohydrate	75.92± 2.25^{a}	72.78± 2.22^{c}	73.32± 2.16^{b}	72.68± 2.08^{d}	71.02± 259^{e}	71.07± 2.52^{f}
Free Energy	361.62.± 2.11^{f}	362.01±2.57^{e}	369.95± 2.01^{d}	371.90± 2.48^{c}	371.98± 1.85^{b}	381.94± 2.18^{a}

Values are mean ± standard deviation of triplicate determinations. Means in the same row with different superscripts are significantly different ($p<0.05$). **MF**: Malted maize flour, **PPF**: Pigeon pea flour

Table 2: Mineral composition (mg/100g) of breakfast cereals formulated from blends of maize and pigeon pea flour.

Parameter	A 100MF:0PPF	B 90MF:10PPF	C 80MF:20PPF	D 70MF:30PPF	E 60MF:40PPF	F 50MF:50PPF
Calcium	23.73± 2.13^{e}	24.16± 2.09^{d}	24.66± 2.04^{c}	24.67± 2.34^{c}	24.82± 2.16^{b}	25.22± 2.48^{a}
Magnesium	19.06± 2.23^{f}	24.44± 2.08^{c}	23.81± 2.10^{d}	23.29± 2.49^{e}	24.77± 2.04^{e}	26.17± 2.02^{a}
Potassium	12.78± 2.13^{f}	14.03± 2.04^{e}	14.41± 2.47^{d}	14.61± 2.20^{c}	15.31± 2.35^{b}	18.47± 2.55^{a}
Phosphorus	62.23± 2.13^{f}	63.39± 2.01^{e}	63.49± 2.04^{d}	63.86± 2.43^{c}	64.38± 2.61^{b}	80.15± 2.11^{a}
Zinc	1.89± 2.01^{f}	2.19± 2.11^{e}	2.29± 2.06^{d}	2.32± 2.18^{c}	2.61± 2.04^{f}	3.33± 2.18^{a}
Iron	3.12± 2.42^{a}	2.33± 2.55^{b}	1.70± 2.11^{c}	1.34± 2.13^{d}	1.30± 2.08^{d}	1.29± 2.09^{e}

Values are mean ± standard deviation of triplicate determinations.Means in the same row with different superscripts are significantly different ($p<0.05$). **MF**: Malted maize flour, **PPF**: Pigeon pea flour

CONCLUSION AND RECOMMENDATION

The study showed that the breakfast cereal products of acceptable nutrient contents and organoleptic properties formulated from blends of malted maize and pigeon pea flour could produce nutritional and acceptable products. It is recommendable to implement the use of pigeon pea in the production of breakfast cereals for food industries because of its high nutrient (protein) profile.

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OB14

Effect of Repetitive Use of Frying Oil on the Profile of Fat Soluble Vitamins

[1]Ngozi, Elizabeth O., [3]Shokunbi, Olutayo S., [2]Olowoyeye, Pheobe A., [2]Adeoye, bolade k., [2]Ani, Ime F., [2]Akinlade, [2]Ademola R., [2]Ajuzie, Nnenna C., [2]Alfa, Tilzar.

[1, 2] Department of Nutrition and Dietetics, [3] Department of Biochemistry School of Basic and Medical Sciences, Babcock University

ngozie@babcock .edu.ng

KEYWORDS: Repetitive use of frying oil, fat soluble vitamins, frying times, monitoring, free fatty acid, iodine value.

BACKGROUND AND OBJECTIVE:

Frying is defined as a "process of immersing food in hot oil at a high temperature between 150 C to 190 C." (10). Frying can be considered a dehydration operation in which a simultaneous heat and mass transfer occurs giving two changes (water outlet from the food to the hot oil and an oil inlet by the food) (16). Frying is a common and universal method of cooking, it is said to be chosen by most people because of the creation of new special flavors and textures making the fried foods to be delicious and enjoyable (7). Repetitive heating of oil leads to rancidity overtime, it accelerates oxidative degradation of lipids forming hazardous reactive oxygen species and depleting the natural antioxidant contents of the cooking oil (17); also, it changes the structure formed by the unsaturated fatty acids which becomes exposed to oxidation, hence the oil goes bad and creates an intent on health hazards overtime. The practice of reusing frying oil exposes consumers to accelerated aging, raised cholesterol levels, obesity and weight gain (21). It is essential to monitor the quality of oils used and to also determine their stability under normal conditions of use in frying (3). Fat Soluble Vitamins are 4 which include; A, D, E, K. It is known that cooking methods often lead to losses of vitamins and other nutrients up to 90% depending on the process used (20). Hence, the quality of frying oil should be regularly monitored to avoid the use of degraded oil and related health consequences after consumption. The research was aimed at investigating the effect of repetitive use of frying oils on the profile of fat soluble vitamins.

MATERIALS AND METHODS:

The study was experimental and t was carried out in Ilisan Remo a town located within Irepodun district in Ikenne local government, Ogun state. Purposive Sampling was used to select 3 different fried food vendors for the research after getting ethical approval. The researcher met with the fried food vendors to inform and prepare them on the study. Frying oil samples of yam, fish and akara at 1st, 5th and 7th frying were collected in different bottles of 120mL from food vendors. Theses samples were analyzed for free fatty acid, saponification number and vitamin ADEK. Statistical analysis was carried out using SPSS 20.0 software, mean and standard deviation was gotten, differences among means were compared, relationship between analysis and food samples as well as frequency of frying with quality of fat soluble vitamins were correlated.

RESULT AND DISCUSSION:

In this study, free fatty acid, iodine value and fat soluble vitamins were used to monitor the degradation of frying oil. Free fatty acid revealed the level of deterioration so as the oil is more prone to oxidation and to turning rancid, the free fatty acid value increases which is an indicator of oil quality as it leads to the development of off-flavor in oils and fried products (12). The initial acid value of fresh oil was found to be higher (1.60, 1.19 and 0.55 mg of KOH/g of frying oil for fish, yam and akara respectively) than the Codex Standard for refined oils (0.3mg of KOH/g). This may be attributed to the oil quality as the commercial vendors purchase oil from the open market without minding brand or quality (8). The free fatty acid value was found to increase after 5 batches of frying, the increase recorded in fish oil was found to be more when compared to frying yam and akara; this may result from the fact that the fresh oil used for fish had higher acid value even before use. Iodine value is important as it gives the extent to which the lipid sample can be prone to oxidation and thus become rancid (4); the higher the iodine value the more double bonds are present in the fat which is the degree of unsaturation (19). The initial iodine value of the fresh oil was found to be lower (18.95, 57.07 and 17.41g of frying oils for fish, yam and akara respectively) than the Codex standard 2005 for refined oils (103-128g) value but the values increased with increase in frying usage of the oil. Again, the initial vitamin A, D, E & K, value of the fresh oil was found to be highest in all the oil samples. The vitamin A value was found to increase after 5 batches of frying. This result however corroborate to the work of Karel (15) which says that Fat-soluble vitamins present in a cooking medium are decomposed mainly due to the effect of an elevated temperature combined with the exposure to oxygen and Fat soluble vitamins though thermo sensitive are important in the stimulation of immune system, liver disorder, fight against cancer and cardiovascular diseases (14).

CONCLUSION AND RECOMMENDATION:

Repeated used of frying oils degrade the quality profile of the oil as the amount of free fatty acid was increasing due to repetitive use of oil by the vendors (more so the fresh oils were of low quality as the commercial vendors purchase oil from the open market without minding the quality of the oil). Again, the iodine value of the oil samples was not up to the standard and the fat-soluble vitamins though tend to increase at the early batch of frying but reduces as the rate of frying progresses while some of frying oils does not even contain these vitamins. The regulatory bodies like National Food and Drug Administration and Control (NAFDAC), Standard Organization of Nigeria (SON) and other food quality regulatory bodies should always go for routine check on fats and oils products sold to consumers and further researches like chemical analysis on physicochemical properties, saponification value and peroxide value for frying oils at different batches of frying starting with fresh oil should be done.

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PC2

Assessment of Available Food Items in Home Food Environment Among Undergraduates in University of Lagos, Nigeria

Bolajoko O. O[1]. John E. P[1]. Adeniji L. O[1]. and Edun B.T[2].
[1]*Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.*
[2]*Ogun State College of Health Technology, Ilese, Ogun State, Nigeria.*
ebenezerjohn15@yahoo.com

KEYWORDS: Assessment, Available food items, Food Environment, Undergraduate

BACKGROUND AND OBJECTIVE:
There is a lot of freedom on campus, where undergraduate students have to make their own decisions including decision on food intake as it affects them. However, choice of food is dependent on the availability of such food. The main aim was to assess the available food items in home food environment among undergraduate students in University of Lagos.

MATERIALS AND METHODS:
This study was carried out at the University of Lagos. Simple random sampling technique using the lottery method procedure was employed in the selection of 6 halls of residence out of 13, while systematic random sampling technique was used to select the study population of 408 undergraduate students from the 6 halls at the University of Lagos. A semi-structured self-administered questionnaires were used to obtain data for food available within the hostels. Collected data was vetted, coded and analysed using SPSS and Microsoft Excel 2019.

RESULT AND DISCUSSION:
Figure 1 below shows the availability of selected food items in the respondents' hostel for consumption in the past one week. The food item with the highest availability was snacks (74.3%), followed by regular non-diet soda (72.1%). The food item with the lowest availability was carrot (26.7%) despite being in season, followed by apple (29.7%) and dark leafy vegetables (45.1%). These results agree with (1) a study on 2402 first-year undergraduate students from one university in Germany, Denmark, Poland and Bulgaria, which indicated that most students failed to consume fruits and vegetables (less than 50% consumed fruits frequently). It was also observed in this present study that less than half of the respondents had regular whole milk (45.8%) available in their hostel for consumption.

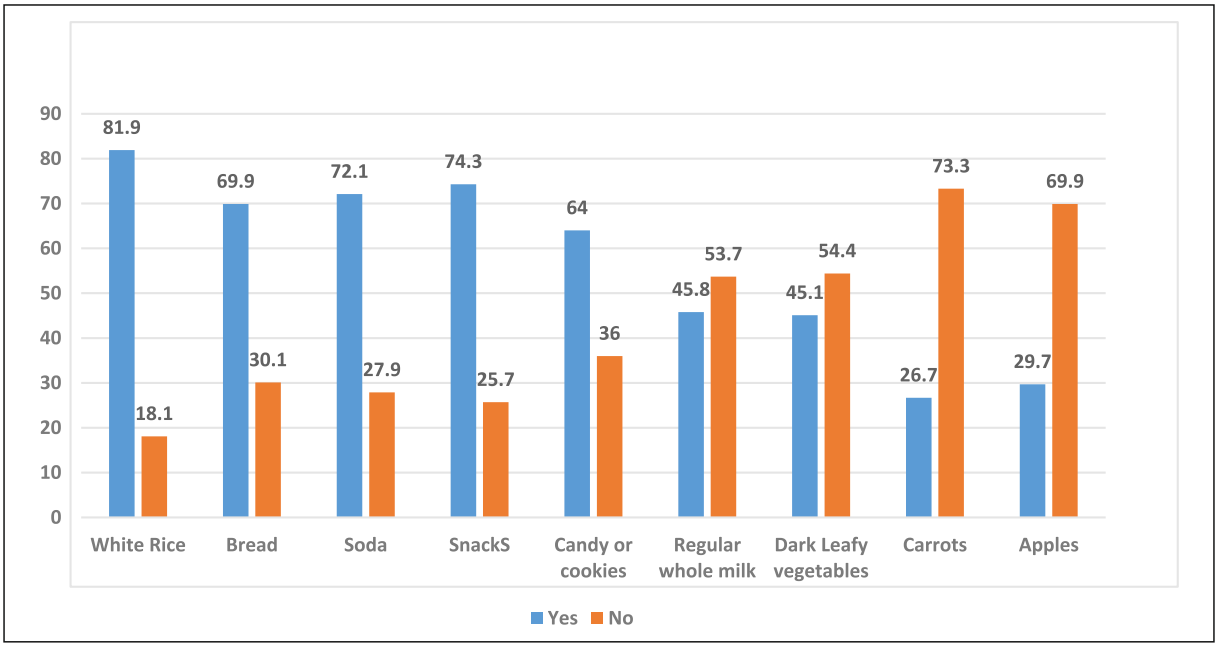

Figure 1: Home food environment (food items available in the past one week) among the Respondents

CONCLUSION AND RECOMMENDATION:

The study concluded that the consumption of fruits was substantially low while dark green vegetables were a little below average and high consumption of snacks, soda, starchy foods such as rice and bread. Such consumption pattern should be discouraged as it does not portray a healthy eating pattern. Units such as Student Affairs, Physical Planning of the University should endeavour to make policies and allocate more stores on campus for availability and accessibility of fruit and vegetables within the school campus and also organise programmes on print and social media targeting the youths to enhance their knowledge on benefits of consuming fruits and vegetables.

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SUB-THEME D: NUTRITION EDUCATION AND AWARENESS FOR SOCIAL AND BEHAVIOUR CHANGE FOR HEALTHIER FOOD SYSTEMS.

PD1

Effect of Nutrition Education on Serological Variables of Type 2 Diabetes Mellitus Patients Attending NNPC Clinic Warri, Delta State Nigeria.

Tasie C.T, Afam-Anene O.C
Department of Nutrition and Dietetics Imo State University, Owerri.
eduntd@gmail.com

KEYWORDS: Nutrition Education, FBS, HbA1C, Total Cholesterol

BACKGROUND AND OBJECTIVE:
The increasing prevalence of diabetes mellitus around the world appears as dramatic as to have been characterized as an epidemic. Diabetes mellitus causes prolonged ill-health, imposes morbidity and mortality risks, and necessitates a change in lifestyle, with a meticulous daily routine and long-term self-care. The objective of the study was to assess the effect of nutrition education on serological variables of the type 2 diabetes mellitus patients.

MATERIALS AND METHODS:
Two Hundred and Thirty (230) out of 258 subjects who participated in the longitudinal study were confirmed Type 2 diabetics. One hundred and Fifty (150) subjects were grouped into education group and Eighty (80) subjects into control group. Baseline information on socio-demographic, life-style characteristics, and management regimens of the diabetics were collected using structured, validated and pretested questionnaires Subject's serological variables such as glycated hemoglobin (HbA1c), Fasting Blood sugar (FBS), 2-hours post prandial (2HPP), total Cholesterol(TC), Low density Lipoprotein Cholesterol (LDL-C), High density Lipoprotein Cholesterol (HDL-C), and Triglyceride (TG) were collected. The nutrition education instituted consists of two sessions for 2 hours performed in a group of 15 patients per session. A sub-sample of 24 subjects was selected from the education group and a meal plan was developed based on their calorie requirements and was followed up monthly for three months. Post Nutrition education and three (3) months follow up information on serological and the life-styles characteristics data of the subjects were collected. The data were analyzed using statistical package for social sciences (SPSS) version 21 and Microsoft Excel. Descriptive statistics, (frequencies, bar and pie charts, percentages, mean and standard deviations) were calculated. Regression analysis was used to determine changes in monthly fasting blood sugar, 2hour postprandial blood glucose level. P-value of <0.05 was taken as statistical significant.

RESULT AND DISCUSSION:
Result showed that about 54% of the subjects in the education group were middle age (40-59 years) and 36% of the control group. For the control group only 6.25% were between 20-30 years and 45.00% of the

subjects were middle age (60-79 years) while 12.25% were 80 years and above. Most (56.67%) of the subjects were male for the education group and 52.50% were male for the control group. For the education group only 1.3% was single, 87.3% were married, 8.7% and 2.76% were widowed and separated respectively while the control group most (80.75%) were married, 8.75% and 2.50% were widowed and separated respectively. The education group Christian religion account for 80.67% of the subjects followed by Islam (16.67%) and other religion (2.67%), while the control group Christian religion account for 83.75% and Islam religion account for16.25%. The education group about 5.33% had primary education, 74.67% had tertiary education while 20.0% had secondary education while the control group about 16.25% had secondary and 83.75% had tertiary education.

Furthermore most of the subjects (70.0%) in the education group at baseline had elevated HbA1c with a mean baseline HbA1c level of 8.08$\pm$1.88%. While most of the subjects (65.00%) in the control group at baseline had normal HbA1c with a mean baseline glycated hemoglobin level of 7.01$\pm$1.86%. However there was a significant difference ($P<0.05$) in the mean and percentage number of HbA1c of the subjects in education and control group. In the education group, Only 6.7% of the subjects had low fasting blood sugar (<4.2mmol/l), 58.0% had high fasting blood sugar (>7.0mmol/l) and 35.3% had normal fasting blood sugar (4.2-5.9mmol/l). After three months follow up, the number of subjects who had normal FBS increased from 35.3% to 54.7%, the low FBS levels increased from 6.5% to 10.0% and high fasting blood sugar levels reduced from 58.0% to 35.3%. In the control group, none of the control subjects had low FBS, 52.50% also had high FBS (>7.0mmol/l) while 47.50% were within normal values (4.2-5.9mmol/l).

About 76.0% of subjects had normal total cholesterol (<200mg/dl) and 24.0% had elevated total cholesterol (>200mg/dl) at pre intervention at the education group. After three months follow up an increase was observed in the number of subjects who had normal total cholesterol from 76.0% to 80.0%, reduction was observed in the number of the subjects who had elevated total cholesterol from 24.0% to 20.0%. In the control group, 35.00% of the subjects had normal total cholesterol (<200mg/dl) and 65.00% had elevated total cholesterol (>200mg/dl) at baseline. After three months, subjects who had normal total cholesterol increased from 35.00% to 40.00% while number of the subjects who had elevated total cholesterol reduced from 65.00% to 60.00%.

About 86.0% subjects in the education group had normal LDL-C level (<150mg/dl) and 13.3% had elevated LDL-C levels (>150mg/dl) at pre intervention. After three months follow up, the number reduced from 86.7% to 77.3% and the number of subjects who had elevated LDL-C levels increased from 13.3% to 22.7%. At baseline, 37.50% of the subjects in the control group had normal LDL-C level (<150mg/dl) and 62.50% had elevated LDL-C levels (>150mg/dl). Three mothers after, LDL-C levels of the subjects reduced from 37.50% to 35.00% and subjects who had elevated LDL-C levels increased from 62.50% to 65.00%. Before nutrition education, most (66.0%) of the respondents had good knowledge of diabetes mellitus, 22.0% had fair knowledge while 12.0% had poor knowledge. Before the nutrition education, less than 47.33% of the respondents had good nutrition knowledge and 32.67% of the respondents had fair nutrition knowledge while 20.0% had poor knowledge. After nutrition education and three (3) months follow up, majority (89.33%) of the respondents had good knowledge, 8.0% and 2.67% of the respondents had fair and poor knowledge, respectively. Before nutrition education, only 26.67% of the respondents were compliance with their medications and 56.0% of the respondents had partial drug compliance while 17.33% of the respondents were non drug compliance. After nutrition education and three (3) months follow up, more than half of the respondents (53.33%) complied with their medications and 39.33% were partially compliance with their drugs while only 7.33% of the respondents were not compliance with their drug.

This study proves that nutrition education and active follow up is effective in diabetes mellitus management. In view of the adverse effects of hyperglycemia leading to severe morbidity and increased mortality among the diabetic subjects, a tight control of blood glucose level is mandatory. Therefore, patient education and follow up are important components of diabetes care regimen.

PD2

Nutritional, Sensory Attributes And Recommended Daily Allowances Of Dried Garden Eggs Chips In Beniseed Soup

GBEYONRON, F.M[1], and CHIKWENDU, J.N[2]

1 Department of Nutrition and Dietetics, Joseph Sarwuan Tarka University, Makurdi, Benue state-Nigeria.
2 Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State-Nigeria
frncamdg@gmail.com

KEYWORDS: Nutritional, sensory attributes, Recommended Daily Allowances, dried garden eggs-beniseed soup

BACKGROUND AND OBJECTIVE:

Consumption of fruits and vegetables has been increased rapidly by people due to awareness regarding their health benefits [1]. Fruits are consumed in their fresh forms normally but it can also be processed into dried chips and produced as soups to diverse its usage and reduce the issue of food insecurity. Beniseed seed is rich in fats, protein, carbohydrates, fibre and some minerals [2]. Garden egg is a fruit with numerous nutritional benefits but there is no nutritional record on its benefit in soups including recommended daily allowance (RDA) to the populace that consume it. The study assessed fruit the nutritional, sensory attributes and Recommended Daily Allowances of dried garden eggs chips in beniseed soup.

MATERIALS AND METHODS:

Freshly harvested garden eggs were purchased at Wannune a local market in Benue, Nigeria. The fruits were washed, drained, shredded into shapes and was sundried for 72 hours. The soups were prepared with dry fish, dry pepper (ground), onions, locust bean (ground), iron tree seed (ground), palm oil, maggi, salt, water and ground beniseed as thickener. Proximate, vitamin and minerals of dried garden egg chips soups were analyzed using standard methods and was compared with RDA while, sensory attributes were evaluated using nine-point hedonic scale. Data was analyzed using analysis of variance while Duncan studentized multiple range test was used to compare means at $p<0.05$ level of significance.

RESULT AND DISCUSSION:

The dried garden egg beniseed soup (DGB) had higher moisture of (63.85%), fat (15.16%), protein (5.77%), while the values for fiber, carbohydrate and ash were (5.78%), (5.01%), and (4.66%), respectively. The soups were high in minerals, with the highest value from phosphorus (733.37 mg), sodium (237.44 mg), potassium (168.76 mg) and magnesium (72.21 mg).While the value from calcium, iron and zinc were (3.54, 0.62, 0.77 mg), respectively. All the values for vitamins were generally low. It ranges from (0.26 mg) for B3, (0.27 mg)for Vitamin C,(0.52 mg) for B6, (0,80 mg)for B1, (0.83 mg) for β-carotene, and (0.93 mg) for B2.The mean score for taste, colour, flavor and overall acceptability in all the samples were significantly different ($p<0.05$).When compared with RDA supplied by the soups to adult male in 300 g portion size for minerals and vitamins, the values were for Ca, 10.62 mg (2.36% RDA), Fe, 1.86 mg (6.41% RDA),Vitamin A, 2.49 mg (0.50% RDA), B1, 2.40 mg (266.67% RDA), B2, 2.79 mg (214.62% RDA), B3,0.78 mg (4.94% RDA) and Ascorbic acid, 0.81 mg (2.70% RDA).

CONCLUSION AND RECOMMENDATION:

Based on the results obtained, consumption of dried garden egg beniseed soup has been revealed to be rich in nutrients and also meet its daily recommended dietary allowance. Therefore, its constant consumption will aid in promoting healthy diets and reduce the issue of food insecurity.

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PD3

Association Of Meal Skipping With Socio-demography and Nutritional Status Of Rural Postmenopausal Women In South-eastern Nigeria: A Community-based Study

[a]Okafor Adaobi Mary-Ann and [a]Onah Nkemdilim
[a]Department of Nutrition and Dietetics, University of Nigeria, Nsukka
adaobi.nwabunze@unn.edu.ng

KEYWORDS: Nutritional, sensory attributes, Recommended Daily Allowances, dried garden eggs-beniseed soup

BACKGROUND AND OBJECTIVE:
Menopause has become an important subject of study due to the global increase in life expectancy as a result of better nutrition and improved health care delivery (Lee et al., 2010).The abrupt endocrine changes during menopausal transition have important impacts on the physiology of the female body which exacerbate risks for many diseases and disabilities during postmenopausal life (Goyal, Mishra & Dwivedi, 2017) and this is made worse when meals are skipped for health reasons and weight control. This study evaluated the association of meal skipping with socio-demography and nutritional status of rural postmenopausal women in a community in south-eastern, Nigeria.

MATERIALS AND METHODS:
A cross-sectional study in which 332 participants were recruited from nine villages in Nsukka community, Nsukka Local Government Area (LGA), Enugu State. Structured and validated questionnaire was used to obtain information on the socio-demographic characteristics and meal skipping habits. Height, weight, waist and hip circumferences measurements were obtained from the participants. Blood pressure, fasting blood glucose and lipid profile of the participants were determined. Statistical Product and Service Solution (SPSS) for windows version 21 was used for statistical analysis. Multinomial logistic regression was used to determine the association between socio-demography, anthropometry, biochemical indices and meal skipping. *p* value of < 0.05 was considered significant.

RESULT AND DISCUSSION:
Participants who were aged 50-55 years, had no formal education, earned 28, 000 – 57, 000 monthly and were in their early postmenopausal status had higher odds of skipping meals. Age, income and postmenopausal status were significantly ($p < 0.05$) associated with meal skipping. Participants who skipped meals were more likely to be obese, diabetic, hypertensive and to have lipid derangement.

Table 1: Meal skipping habits of the participants

Variables	Frequency	Percentage
Skip meals		
Yes	142	42.8
No	190	57.2
Total	**332**	**100.0**
Frequency of skipping meals		
Daily	11	3.3
Sometimes	131	39.5
Never	190	57.2
Total	**332**	**100.0**
Meals skipped		
Breakfast only	64	45.1
Breakfast and lunch	6	4.2
Breakfast and dinner	5	3.5
Lunch only	34	24.0
Dinner only	33	23.2
Total	**142**	**100.0**

Variables	Skip meals		Total	COR	95% CI
	Yes	No			
Age (years)					
50 -55	17 (12.0)	13 (6.8)	30 (9.0)	2.261*	1.026 – 4.982
56 – 60	64 (45.1)	77 (40.5)	141 (42.5)	1.396	0.880 – 2.215
>60	61 (43.0)	100 (52.6)	161 (48.5)		
Educational status attained					
No formal education	21 (14.8)	22 (11.6)	43 (13.0)	1.338	0.650 – 2.755
Primary education	27 (19.0)	36 (18.9)	63 (19.0)	1.154	0.608 – 2.192
Secondary education	54 (38.0)	73 (38.4)	127 (38.2)	1.102	0.645 – 1.883
Tertiary education	40 (28.2)	59 (31.1)	99 (29.8)		
Monthly income (₦)					
≤ 27,000	77 (54.2)	103 (54.2)	180 (54.2)	1.589	0.900 – 2.803
28, 000 – 57, 000	39 (27.5)	38 (20.0)	77 (23.2)	2.071*	1.071 – 4.004
≥58, 000	26 (18.3)	49 (25.8)	75 (22.6)		
Postmenopausal status					
Early postmenopausal status	24 (16.9)	11 (5.8)	35 (10.5)	2.991*	1.433 – 6.242
Late postmenopausal status	118 (83.1)	179 (94.2)	297 (89.5)		

***= p < 0.05**

CONCLUSION AND RECOMMENDATİON(S):

Meal skipping was significantly ($p < 0.05$) associated with age, monthly income and postmenopausal status. Awareness on the need for regular meal consumption among postmenopausal women should be created to prevent its negative effect.

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PD6

Eating Disorders in Adolescent Students of Tertiary Institutions in Lagos, Nigeria

UBOSI, N.I[1*], BOLAJOKO, O.O[2], ONABANJO, O.O[3]

[a] [1]*Department of Public Health, National Open University of Nigeria*

[2,3]*Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta*

iubosi@noun.edu.ng

KEYWORDS: Eating-disorders, Adolescents', Nutritional-status, Academic-performance.

BACKGROUND AND OBJECTIVE:

Eating disorders are psychological problems that can affect adolescents' eating habits, nutritional status, and academic performance. This study assessed the relationship between eating disorders and academic performance of adolescents in six selected tertiary institutions in Lagos State, Nigeria.

MATERIALS AND METHODS:

Adolescents at risk of eating disorder were identified using an adapted 26 item Eating Attitude Test from 866 adolescents selected through a multi-stage sampling technique across selected higher institutions in Lagos State. Moreover, an adapted Eating Disorder Inventory-3 (EDI-3) questionnaire was used as a diagnostic tool to assess the presence of eating disorders. Students Cumulative Grade Point Average was used to assess academic performance. Data were analysed using frequency counts, percentages, mean, and Chi-Square analysis.

RESULT AND DISCUSSION:

Results revealed that 63.7% of the respondents were female, 43.5% were university students, while 33.3% and 23.2% attended polytechnics and colleges of education respectively. In addition, 21.8%were at risk of eating disorders, of which anorexia nervosa-restricting (AN-R) sub-types (65.7%) was the most prevalent.

Chi-square results showed significant ($p<0.05$) association between respondents' academic performance ($\chi^2=13.124$; df=2) and anorexia nervosa-restricting sub-types. Eating disorders, especially anorexia nervosa-restrictive sub-type affected the adolescents' academic performance.

Results of this study agree with earlier studies that have shown a high risk of eating disorders among students in tertiary institutions [1]. Also, in line is the assertion that Mental disorder is one of the major related causes of poor academic performances in children (https://www.heretohelp.bc.ca/factsheet/mental-illnesses-in-children-and-youth) [2]

Table 1: The clinical qualitative ranges of diagnostic groups by eating disorder risk composite

Parameters	**Variable (n=866)**	**N**	**%**
Eating attitude test score	<20 (Normal range score)	677	78.2
	≥ 20 (At risk of ED)	189	21.8
	Total	866	100
Diagnostic groups	**Range (n=242)**	**N**	**%**
(AN-R)	Low Clinical	83	34.3
	Typical Clinical	98	**40.5**
	Elevated Clinical	61	**25.2**
(AN-B/P)	Low Clinical	147	60.7
	Typical Clinical	94	38.8
	Elevated Clinical	1	0.4
Bulimia nervosa	Low Clinical	238	98.3
	Typical Clinical	4	1.7
	Elevated Clinical	0	0
EDNOS	Low Clinical	212	87.6
	Typical Clinical	29	12.0
	Elevated Clinical	1	0.4

AN-R: Anorexia nervosa restricting type, AN-B/P: Anorexia nervosa Binge/Purging, EDNOS: Eating disorders not otherwise specified. Low clinical range (1-24percentile), Typical Clinical (25-66 percentiles), Elevated clinical (67 and above)

Table2: Association between Anorexia Nervosa-Restricting subtype and Academic Performance of the Respondents

	Anorexia nervosa-R										
	Low Clinical Range		**Typical Clinical Range**		**Elevated Clinical Range**		**Total**		**χ^2**		**P-value**
Academic Performance	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**		**df**	
CGPA									13.124	4	0.041
> Average (2:1)	6	28.6	8	38.1	7	33.3	21	100.0			
Average (2:2)	10	34.5	16	55.2	3	10.3	29	100,0			
Lower Extreme (Pass/3rd Class)	7	46.7	2	13.3	6	40.0	15	100.0			
Total	23	35.4	26	40.0	16	24.6	65	100.0			

Low clinical range (1-24percentile), Clinical signs (25-66 percentiles), Elevated clinical (67 and above)

CONCLUSION AND RECOMMENDATION:
The study concluded that eating disorders rsulted in low academic performance. Consequently, promoting mindful eating is imperative.

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PD7

Antenatal care attendance and birth outcome among pregnant women at maigana ward, soba local government area kaduna state, nigeria.

Lakka Hajara Durkwaa[1] and Owolabi Olumuyiwa Adeyemi[2]
Department of Biochemistry, Ahmadu Bello University Zaria, Kaduna State, Nigeria

KEYWORDS: Anternal Care, Birth Outcome, Micronutrient, Pregnancy

BACKGROUND:
Antenatal care (ANC) is a key strategy to decreasing maternal mortality in low-resource settings. Its provide resources to improve nutrition, health knowledge and promote preventive health practices

OBJECTIVE:
The effect of antenatal care attendance on birth outcome among randomly selected pregnant women in their third trimester in Maigana Ward of Soba Local Government Area, of Kaduna state

METHODS:
One hundred and three randomly selected pregnant women in their third trimester were used for the survey. Micronutrient status and antenatal care attendance score were determined using, atomic Absorption Spectrophotometry and anternatal care score formula. Baby's birth weight at delivery were determined using standard methods.(UNICEF, 2009)

RESULTS:
The antenatal care attendance and compliance status indicated that 76.7% were below compliance, 16.5% had minimal compliance and 6.8% had desired compliance.The mean micronutrient serum concentration (μmol) were 4.02, 2.52 and 0.45 for iron (Fe),zinc (Zn) and vitamin A respectively, leaving 73.1%, 96.2% and all (100%) deficient of the micronutrients.The incidence of low birth weights was 16.5%. Iron level and maternal nutritional status had significant association with low birth weight ($\chi 2=7.344$, $p=0.007$) ($\chi 2=40.713$, $p=0.000$) respectively. Women with desired compliance scores had baby's with optimal weight at delivery.

CONLUSION: These studies establish, that antenatal compliance of the pregnant women was determinants of their birth outcome in Maigana ward of Soba LGA. There should be more advocacy on importances of antenatal care and supplementation during pregnancy.

OD9

Infant And Young Child Feeding (iycf) Practices Compliance Rate In Yakurr Local Government Area (lga) Of Cross River State, Nigeria.

Otu[1], K. A., Ene-Obong[2], H. N. Ingwu[3], J. A.
[1]*School of Basic Midwifery, Calabar, Cross River State, Nigeria*
[2]*Deoartment of Human Nutrition & Dietetics, Faculy of Basic Medical Sciences, University of Calabar, Calabar, Cross River State, Nigeria*
[3]*Public Health Department, Ministry of health Headquarters, Calabar, Nigeria.*

KEYWORDS: Infant And Young Child, Feeding Practices, Compliance Rate.

BACKGROUND AND OBJECTIVE:
Adequate nutrition for infants and young children implies compliance by mothers and caregivers to the WHO recommendation of exclusive breastfeeding during the first six months of life, continued breastfeeding until two years, as well as introduction of adequate, nutrient dense and safe, complementary foods from six months of age (1). This is very vital for the health, proper growth and development of infants and young children.

OBJECTIVE:
To determine the IYCF compliance rate in Yakurr LGA of Cross River State, Nigeria.

MATERIALS AND METHODS:
Using multi-stage sampling technique, a total of 329 mother-child pairs comprising of 162 and 167 male and female children, respectively were selected. Data collection methods included use of questionnaires and 24-hour dietary recall. Compliance rate was measured for children 6-23 months using the WHO IYCF indicators (2) and values compared with the 2018 NDHS data (3). Results are presented in percentages.

RESULTS AND DISCUSSION
Early introduction of breast feeding within the first day was high (92%) compared to national data (82.3%) and State value (86.9%). Exclusive breastfeeding rate (26%) was slightly below national average (29%) (3). By the 6th months all the women had introduced semi sold, solid and soft foods. Continuous breastfeeding at one year (33%), and two years (0%) were lower than national averages (82.93% and 27.83%, respectively). The 99% ever breastfed infants was consistent with the State and national data (97.9% and 97%, respectively). Minimum dietary diversity (98%) and minimum meal frequency (72.4%) were more than double both the State and national rates. This needs to be interpreted with caution as mothers tend to give little of everything they eat to their children, irrespective of the quantity. Age-appropriate breastfeeding (54%) in this study was similar to the national value (55.4%). Predominant breastfeeding under 6 month was also low compared to national data.

BACKGROUND AND OBJECTIVE:

Adequate nutrition for infants and young children implies compliance by mothers and caregivers to the WHO recommendation of exclusive breastfeeding during the first six months of life, continued breastfeeding until two years, as well as introduction of adequate, nutrient dense and safe, complementary foods from six months of age (1). This is very vital for the health, proper growth and development of infants and young children.

OBJECTIVE:

To determine the IYCF compliance rate in Yakurr LGA of Cross River State, Nigeria.

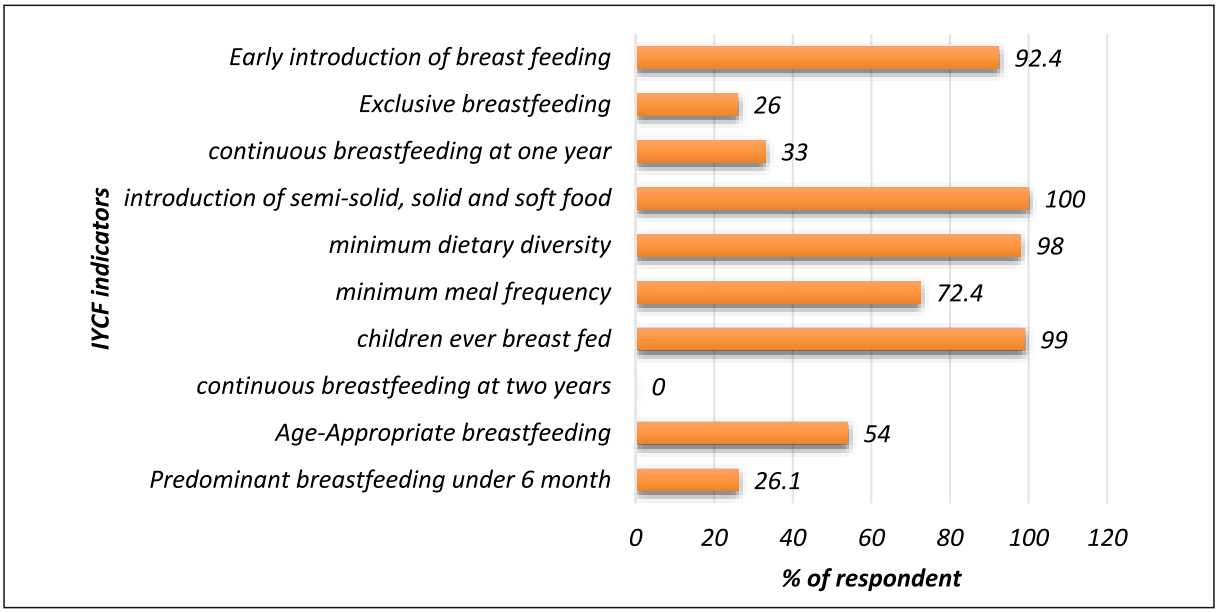

Fig. 1: IYCF indicators for children 0-23 months in Yakurr LGA, Cross River State

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OD10

Vitamin And Mineral Compositions Of *Spondiasmombin*, *Canariumschweinfurthii*and *Citrus Sinensis* Fruits From Abakaliki, Nigeria.

Asouzu N. C.[1], Offor C. E.[2], Aja P. N.[2], Asouzu N. C.[3], Ifediora C. C.[4], Iheme G. O.[5]

1.Department of Nutrition and Dietetics, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Nigeria.

2.Department of Biochemistry, Ebonyi State University, Abakaliki, Nigeria.

3.Department of Physiotherapy, Alex Ekwueme Federal University Teaching Hospital, Abakaliki, Nigeria.

4.Cardiocare Multispecialty Hospital, Area 11, Garki, Abuja.

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

Email: mmanonso2302@gmail.com

KEYWORDS: Vitamins, minerals, fruits

BACKGROUND AND OBJECTIVE:

Neglected and underutilized fruit varieties are often considered 'minor', which negatively affects their production and their consumption (IPGRI, 2002). This may be attributed to poor nutritional information on the constituents of those poorly utilized fruit varieties when compared to the well utilized fruit varieties (Bhandari and Banjara, 2015). The Objective of the study is to comparatively study the vitamin and mineral compositions of fruits of *Spodias mombin,Canarium schweinfurthii* and *Citrus sinensis* from Abakaliki, Nigeria.

MATERIALS AND METHODS:

The materials are fresh samples of *Spodias mombin,Canariumschweinfurthii* and *Citrussinensis* fruits from Abakaliki. The nutritional analyses of the fresh samples were done with the methods of Association of Official Analytical Chemist (AOAC, 1990; 2007).

RESULTS AND DISCUSSION Retinol, riboflavin, tocopherol, calciferol, phyloquinon and Biotin levels contained in *C. schweinfurthii* fruit were significantly ($p<0.05$) higher compared to those in *S. Mombin and C. Sinensis*. Ascorbic acid and cobalamin levels of *C. schweinfurthii* fruit were significantly ($p<0.05$) lower. There were significant ($p<0.05$) higher levels of thiamine, pyridoxine and niacin in *S. mombin* fruit. Folic acid level in *S. mombin* fruit was significantly ($p<0.05$) lower compared to the level in the other two fruits.

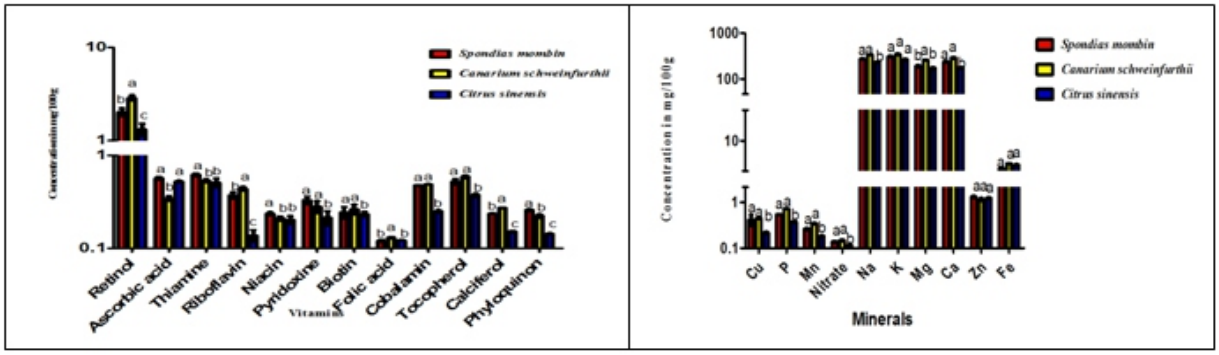

Figure 1: Vitamins and Minerals Compositions in Citrus sinensis, Canariumschweinfurthii and Spondiasmombin Fruits.

The copper and nitrate levels of C. *Sinenesis* was significantly ($p<0.05$) lower relative to the levels in the other fruits. The phosphorus, calcium, sodium and potassium levels of C. *schweinfurthii* fruit were significantly ($p<0.05$) higher. The zinc and iron levels were significantly ($p<0.05$) lower in C. *schweinfurthii* and *S. Mombin* fruits respectively.

CONCLUSION AND RECOMMENDATION: C. *sinensis* fruit, which is a highly utilized fruit has no nutritional advantage in terms of vitamins and minerals over the moderately utilized C. *schweinfurthii* and the underutilized *S. Mombin* while C. *Schweinfurthii* showed significant ($p < 0.05$) nutritional advantage over the other two. These finding should be used as teaching tool to enhance the utilization of the underutilized fruits.

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PD11

Knowledge, Attitude and Practice (KAP)of Nutrition on the Onset of Menopause Among Nurses in SKMH and YDMH in Kaduna state.

Safiya A.T, Maimuna L.A, Hannah Yisa

Department of Nutrition and Dietetics, Kaduna Polytechnic, Kaduna State.

safiyaaliyutijani@gmail.com

KEYWORDS: Menopause, Nutrition, KAP, Onset.

BACKGROUND AND OBJECTIVES:

A certain time of any woman's life, she may experience permanent stoppage or Cessation of menstruation, a condition known as Menopause. The transition can be naturally due to aging or medical reason. Menopause is an extremely important yet complex period during which many changes occur in a woman in an erratic way. It is essential to ensure that women understand that menopause represents a change of life and not an end of life (1). Menopause does cause radical attractions in women's physiological functioning and can cause anxiety in women who do not understand the changes that are taking place. It is fundamental for Nurses to have good KAP of nutrition in menopause transition to guide, educate, and advise women on what they need to do

to attain good nutritional status and healthy well-being during the transition (2). (3) advocated that the same type of attention given to HIV today in terms of information and education should be given to menopause even though it concerns only women. To my knowledge, no studies were conducted on KAP of Nutrition on the Onset of Menopause among Nurses in Shehu Kangiwa Memorial Hospital (SKMH) and Yusuf Dantshoho Memorial Hospital (YDMH) in Kaduna State.

METHOD

A descriptive survey design was used to collect data using purposive sampling technique. All health workers in the Nursing profession in SKMH and YDMH were sampled. A structured and validated interviewer-administered questionnaire was used to elicit information from fifty (50) respondents. Data obtained include Socio-Demographic, KAP of Nutrition on the Onset of Menopause Among Nurses in SKMH and YDMH in Kaduna state. Data were analyzed using SPSS Version 20.0 using descriptive statistics of Frequency and Percentage.

RESULTS AND DISCUSSION

A total of seventy-eight (78) questionnaires were administered, but only fifty (50) questionnaires were valid. Table 1. Show the respondents' knowledge on the type of food menopausal women should eat. This indicated that half (50%) of the Nurses from SKMH go for cereals and cereal products, while only 10.0% of the Nurses from YDMH recommend the same. This show that Nurses from both hospitals lack adequate knowledge on the basic nutrient a menopausal woman needs during the transition. The need for a high intake of fruits and vegetables to promote longevity was advised by an equal percentage (20%) of the nurses from both hospitals. This indicates that some few numbers of Nurses from both hospitals (SKMH and YDMH) have a good KAP of Nutrition on the onset of Menopause.

CONCLUSION AND RECOMMENDATION

Although some Nurses from both Hospitals (SKMH and YDMH) had good KAP on Basic Knowledge of Menopause, there is a need to create awareness or an enlightenment campaign on the importance of nutrition on the onset of menopause. There is still a need to train the health care providers, particularly those working at the primary health care level, on how to counsel, educate, and advise women on the importance of having a good nutritional status on the onset of menopause.

REFERENCES

PD12

Appropriate Breastfeeding Practices and Associated Factors among Nursing Mothers in Wamba Local Government Area, Nasarawa State

Awogbenja MD[1], Danjuma M [1]& Osabo P[1]
Department of Home Science and Management, Faculty of Agriculture, Nasarwa State University, Keffi, Lafia- Campus.
dendus12@gmail.com

KEYWORDS: Infant feeding practice, Breastfeeding initiation, Colostrums, Pre-lacteal

BACKGROUND AND OBJECTIVES:
Nutrition during the entire life cycle is a key driver of growth and development. The feeding of infants is critical to immediate and future health, especially in developing countries such as Nigeria, with high rates of malnutrition, infectious diseases, and mortality among under-five children (1). The study was carried out to assess the complementary feeding practices and the associated factors among nursing mothers of children 6-23 months attending child welfare centres in four Primary Health Care (PHCs) in Wamba Local Government Area of Nasarawa state.

METHODS:
A cross-sectional descriptive survey was conducted. A total of 200 mothers who had children 6-23 months were selected for the study. Simple random sampling was used for sample selection. Data were collected using pre-tested interviewer administered structured questionnaire. Data were analyzed using Statistical Package for Social Sciences (SPSS) statistical software (version 20), and to identify associated factor, chi-square was used and the level of significance set at $p < 0.5$. The data was presented by tables and graph

RESULTS AND DISCUSSION:
The modal age group of the respondents was aged 18-28 years; 32.0% of the respondents had no formal education. Majority (84.5%) of the mothers initiated breastfeeding within 1 hour of delivery, 85.0% fed their babies with colostrums, 59.5% breastfed on demand, and 72.0% of the mothers used spoons and cups in feeding the babies. The prevalence of pre-lacteal feed among respondents was 21.0%, with glucose (8.0%) and plain water (5.5%) being the common pre-lacteal feeds used by the respondents and the main reason was that it makes the baby strong. The study revealed that the mothers started well on exclusive breastfeeding. However, the introduction of other liquids may result in a decrease in the rate of exclusive breastfeeding (EBF) among the mothers. This contributes to why Nigeria is classified as one of the countries in Africa with the lowest EBF rate (2). About (9.0%) of the infants were wasted, 6.5% were severely stunted, while 6.0% were obese. The study revealed evidence of long-term poor infant feeding (stunting) among the children, which is a pointer to the fact that malnutrition begins early in life due to poor feeding practices.

TABLE 1: SHOWING MOTHERS BREASTFEEDING PRACTICES

VARIABLES	FREQUENCY (f)	PERCENTAGE (%)
EVER BREAST FEED		
Yes	198	99.0
No	2	1.0
BREASTFEEDING INITIATION		
Within 30mins	108	54.0
Within 1 hour	61	30.5
12 hours	21	10.5
48 hours	6	3.0
After 48 hours	4	2.0
FEED THE BABY WITH COLOSTRUM		
Yes	170	85.0
No	30	15.0
IF NO, WHY		
Not safe and dirty	30	15.0
Not applicable	170	85.0
NO OF TIME BREASTFEED PER DAY		
2 Times	2	1.0
3-4 Times	4	2.0
5-6 Times	12	6.0
7-8 Times	10	5.0
More than 8	53	26.5
On demand	119	59.5
PRE-LACTEAL FEED		
Yes	42	21.0
No	158	79.0
IF YES, WHAT DO GIVE		
Not applicable	158	79.0
Plain water	11	5.5
Glucose	16	8.0
Honey	6	3.0
Coconut water	9	4.5
REASON GIVE ANYTHING BEFORE INIATIATING BREAST MILK		
No breast milk	9	4.5
Make baby strong	19	9.5
Improve sight	8	4.0
Thirsty	6	3.0
Not applicable	158	79.0

CONCLUSION AND RECOMMENDATION:

The use of pre-lacteal feeds is still a challenge among mothers; therefore, there is urgent need for awareness creation on the consequences of the use of prelacteal feed on the children's health.

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PD14

Nutrition Education and its Impact on the Traditional Feeding Practices of Young Women in Umuahia North Local Government Area Of Abia State

Ezenwa HC[1], Iheme GO[1], Okonkwo E.M[1] and Achinihu G.A[2].

[1]*Department of Human Nutrition and Dietetics, Michael Okpara University of Agriculture Umudike, PMB 7267 Umuahia, Abia state Nigeria.*

[2]*Department of Home Economics, Alvan Ikoku Federal College of Education, Owerri*

nessmyk@yahoo.com

KEYWORDS: Nutrition Education, Nutrition Knowledge, Traditional Feeding Practices, Young Women

BACKGROUND AND OBJECTIVES

Feeding practices are deep-rooted in cultural norms, heritage and values, and this influences the way people select, cook, serve and eat food. The nutritional demands of reproductive-aged women make nutrition education a veritable tool to improve knowledge and foster healthy feeding practices. This study assessed the impact of nutrition education on knowledge and traditional feeding practices of young women in Umuahia North LGA of Abia State.

MATERIAL AND METHODS

A descriptive cross-sectional study design was used to assess the nutrition knowledge and traditional feeding practices of young women in Umuahia North LGA Abia State. A multi-stage sampling technique was used to select 210 young women aged 15-59 years. Nutrition education intervention focused on traditional feeding practices was administered to the respondents. Descriptive and inferential statistics were computed for the continuous and categorical variables. All analysis was done with IBM SPSS Version 22.

RESULTS AND DISCUSSION:

The results showed that the baseline nutrition knowledge of respondents was moderate (54%), and 47% got their nutrition information from antenatal clinics. 95% of the respondents affirmed that culture influences the feeding practices in the communities. Families had no fixed mealtime as reported by a majority (95%) of them. Children were not given meat/fish; the father /elderly member of the family received the biggest portion of meat and fish. Most of the staples consumed were from tubers, and vegetables were consumed during festive seasons.

Nutrition education provided enough information on food's nutrition content and has aided adequate food selection and preparation. The impact of nutrition education study showed that some food taboos have

been given up in recent times as reported by 77% of the respondents, and that in early life, consumption of meat/fish does not make one become a thief. Mealtime preparation was no longer left in the hands of mothers alone. Meat/fish, fruits, vegetables such as ukazi and achara are now consumed regularly, as attested by 85% of the respondents. The positive impact of nutrition education on traditional feeding practices is supported by studies that reported that good knowledge/education should be associated with good attitude and proper nutritional practices (1-2)

CONCLUSIONS AND RECOMMENDATIONS:
Nutrition education improved the nutrition knowledge and traditional feeding practices of reproductive aged women. Nutrition education should be introduced right from the primary school level; the government and other stakeholders should provide an adequate fund for training and retraining.

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PD15

Evaluation Of Nutritional Profile Of Two Raw Food Stuffs from Three Markets In Ibadan.

[*]Mosuro, A. O[1]., Ogundele, A. E[1]., Obiodiaka, C. E[1]., Ladokun, O. A[1]. and Ayodele, F. O[2].
[1] *Department of Human Nutrition & Dietetics, Lead City University, Ibadan*
[2] *Federal Institute of Industrial Research, Oshodi, Lagos. NigeriaMosuro.aderonke@lcu.edu.ng*

KEYWORDS: Food Stuff, Market-Handling, Proximate Composition, Nutrition

BACKGROUND AND OBJECTIVE
Locally sourced raw food stuffs originate from locations far away from their place of consumption. The food system in areas of consumption vary from place to place and the factors that drive the food system viz production, processing, distribution and consumption vary in their execution across the globe and within countries (1). The Nigerian federal ministry of health reported an outdated food industry and food system after a survey conducted in 2010 (2). Factors highlighted amongst others include lack of awareness of socio-economic importance of food safety. The same report also highlighted non-compliance with proper standards of safe handling of foodstuff throughout the food chain. Regulatory bodies are many without specific areas of focus in food safety regulation (3). The role of raw food stuffs in the nutrition of an average individual is important. Market handling of food stuffs by the wholesalers and retailers varies from one market to another and could possibly affect the nutrients composition of foodstuffs. Post-harvest handling has also been implicated in variations in proximate composition of food products (4). This study was designed to investigate the proximate composition of two protein foodstuff as affected by market handling in three locations.

MATERIALS AND METHODS

Raw honey-beans and groundnuts were purchased from three different markets and identified as same varieties before winnowing and removing the stones. Clean samples were stored in airtight containers ready for analysis. Using a 3 × 2 factorial method in a completely randomized design, samples were assayed in triplicates for proximate composition according to standard procedures data were subjected to ANOVA at $\alpha_{0.05}$and means were separated using Duncan's Multiple range Test.

RESULTS AND DISCUSSION

The results of main effects of market handling on proximate parameters are shown in tables 1. Dry Matter contents of foodstuffs varied by market location, Dugbe (91.37±0.64%) and Sango (91.46±0.43%) DM were similar and higher than 90.64±1.81% in Oja-Oba. The CP in samples from Dugbe (27.21±10.02%) and Oja Oba (27.17±10.37%) were similar (P>0.05) and lower than 28.40±11.11% found in samples from Sango market. The 21.75±6.61% CHO found in samples from Dugbe market was similar (P>0.05) to 21.02±7.38% CHO in samples from oja oba but higher than 21.14±8.87% found in samples from Sango market. The samples from Sango and Oja Oba were however similar (P>0.05). Crude fat, crude Fibre and ash contents of samples were all similar (P>0.05) irrespective of market location. The observed variations in proximate composition by location may be because the samples found in different markets may have been handled and stored differently by the traders involved. This agrees with report of (4) that processing method in raw foodstuff affects dry matter content. This is also like the findings of (5) who reported that chemical composition of raw foods varies from one source to another.

Table 1: Main effect of Market Location on Proximate Composition of Foodstuff Samples

Market Location	Dry Matter (%) (DM)	Crude protein (%)	Crude fat (%)	Crude fibre (%)	Ash (%)	Carbohydrate (%)
Oja Oba	90.64±1.81^{b}	27.17±10.37^{b}	13.16±12.22^{a}	24.36±7.38^{a}	4.94±0.32^{a}	21.02±7.38^{ab}
Dugbe	91.37±0.64^{a}	27.21±10.02^{b}	12.94±12.07^{a}	24.36±8.91^{a}	5.09±0.65^{a}	21.75±6.61^{a}
Sango	91.46±0.43^{a}	28.40±11.11^{a}	13.34±12.46^{a}	24.61±10.26^{a}	4.99±0.195^{a}	21.14±8.87^{b}

Means with different superscripts are significantly different

Results of the effect of sample types on proximate composition is shown in Table 2. There were significant differences observed in the proximate composition of samples. DM in GN (91.54±0.62) was higher (P<0.05) than 90.76±1.41% found in HB. CP of 37.15±1.37% in HB was higher (P<0.05) than 18.04±0.74% in GN. Crude fat of 1.98±0.64% in HB was much lower (P<0.05) than 24.32±0.40% in GN. Higher (P<0.05) crude fibre (32.42±2.09%) and Ash (5.16±0.32%) than 16.46±1.33% crude fibre and 4.85±0.65% ash in GN samples. CHO in GN (27.88±0.55%) was higher (P<0.05) than 14.06±1.92% in HB. Variations observed in the effect of sample type on proximate composition of samples may be due to post-harvest handling of food products; (4) alluded to this in his findings. The time of harvest of crops at maturity may also affect the proximate composition of food crops. Market handling may also affect proximate composition of foodstuff as the DM may reduce with pest activity.

Table 2: Main effect of sample types on proximate composition of selected foodstuff

Sample	Dry Matter (%)	Crude protein (%)	Crude fat (%)	Crude fibre (%)	Ash (%)	CHO (%)
HB	90.76±1.41^{b}	37.15±1.37^{a}	1.98±0.64^{b}	32.42±2.09^{a}	5.16±0.32^{a}	14.06±1.92^{b}
GN	91.54±0.62^{a}	18.04±0.74^{b}	24.32±0.4^{a}	16.46±1.33^{b}	4.85±0.65^{b}	27.88±0.55^{a}

Means with different superscripts are significantly different. HB – Honey beans; GN – Ground nut; CHO – Carbohydrate. DM – Dry matter; CP – Crude protein,

CONCLUSION AND RECOMMENDATION

The findings in this study shows that proximate composition of selected protein foodstuffs was affected by market location and variety type. It is recommended that market handling practices be regulated across markets in Nigeria.

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SUB-THEME E: PROMOTING HEALTHY DIETS THROUGH FOOD SYSTEMS TRANSFORMATION/ SUSTAINABLE FOOD SYSTEMS FOR IMPROVED DIETARY PATTERN AND PRACTICES- IMPLICATION FOR HEALTH AND DISEASE MANAGEMENT

OE2

Dietary Pattern And Nutrient Intake Adequacy Among Adults In Ogun State

Oladoyinbo C. A.[1*] **and Sodiya O. M.**[1]
[1]*Federal University of Agriculture Abeokuta*
Email: cathbadejo@gmail.com

KEYWORDS: Dietary Intake, Adequate diet, Body Mass index, Dietary Diversity

BACKGROUND AND OBJECTIVE:
Dietary pattern is linked to foods that promote adverse health outcomes as well as food that promote good health. A healthy dietary pattern is characterized by high factor loadings of vegetables, fruits, non-fried fish and chicken, and water (1) and unhealthy dietary patterns are among the major risk factors for obesity and related chronic diseases (2). Traditional healthy diets are being progressively replaced by more westernized dietary patterns and adults seems to be the most affected by this transition. Therefore, this study aims to assess the dietary pattern and nutrient intake adequacy of adults in Abeokuta South Local Government Area, Ogun State.

MATERIALS AND METHODS:
This study is a cross-sectional, descriptive study that comprises of 380 respondents. A multistage sampling technique was used to select respondents. A well-structured questionnaire was designed to collect information on personal characteristics. Anthropometric measurement was done using weighing scale, height meter and non-extendable tape measure. Dietary pattern and intake were assessed using an adapted food frequency questionnaire and 24-hour dietary recall questionnaire. Adapted Total Dietary Intake Assessment (TDA) tool and the Nigerian Food composition Database (version 1) was used to convert food intake into nutrient intake. Descriptive statistics such as frequencies, mean, median, percentages were done. Chi-square was used to test for associations between variables.

RESULTS AND DISCUSSION
Results show that 62.7% of the respondents were female and 37.9% male. About 35.5% and 15.8% were overweight and obese respectively while 33.2% had abdominal obesity. A significant relationship was observed between BMI and age (P=0.003). Among the cereals, white rice (15.6%), noodles (7.4%) and wheat white bread (6.5%) were the most frequently consumed food. Consumption of rice in different forms accounted for 29% of all the cereals. Dry gari(11.3%) and 'eba' (11.1%) were the most frequently consumed foods among the roots and tubers while orange (20.1%) and watermelon (13.8%) were the most frequently consumed fruits. Jute mallow (24.4%) was the most frequently consumed vegetable. Evaporated milk (29.4%) and powdered milk (27.5%) were more consumed in the milk and Cdairy product group.

Table 1: Nutrient intake adequacy of the respondent

Nutrient	Male			Female			
	Low intake (%)	Adequate intake (%)	Excess intake (%)	Low intake (%)	Adequate intake (%)	Excess intake (%)	P-value
Energy	4 (2.8)	26 (18.3)	112(78.9)	7 (2.9)	30(12.6)	201(84.5)	0.316
Protein	2(1.4)	6(4.2)	134(94.4)	1(0.4)	11(4.6)	226(95)	0.567
Carbohydrate	2(1.4)	8(5.6)	132(93)	2(0.8)	12(5)	224(94.1)	0.842
Fat	37(26.1)	23(16.2)	82(57.7)	53(22.3)	43(18.1)	142(59.7)	0.000*
Vitamin A	24(16.9)	4(2.8)	114(80.3)	33(13.9)	15(6.3)	190(79.8)	0.258
Vitamin C	109(76.8)	6(4.2)	27(19)	152(63.9)	13(5.5)	73(30.7)	0.030*
Calcium	127(89.4)	8(5.6)	7(4.9)	213(89.5)	11(4.6)	14(5.9)	0.849
Phosphorus	20(14.1)	13(9.2)	109(76.8)	40(16.8)	50(21)	148(62.2)	0.005*
sodium	68(47.9)	12(8.5)	62(43.7)	127(53.4)	27(11.3)	84(35.3)	0.239
Potassium	113(79.6)	19(13.4)	10(7)	210(88.2)	20(8.4)	8(3.4)	0.065
Zinc	11(7.7)	17(12)	114(80.3)	24(10.1)	46(19.3)	168(70.6)	0.027*
Iron	0(0)	0(0)	142(100)	3(1.3)	7(2.9)	228(95.8)	0.047*
Magnesium	42(29.6)	38(26.8)	62(43.7)	52(21.8)	61(25.6)	125(52.5)	0.165

The energy intake was excess among 78.9% of the male and 84.5% of the female while low intake of vitamin C was observed among 76.8% of male and 63.9% of female. Intake of Zinc, Phosphorus and Iron was observed to be statistically significant different among the male and female respondents.

CONCLUSION AND RECOMMENDATION:

Overweight and obesity was observed to increase as age increases. The energy intake of the respondent was above the recommended daily allowance. Adequate intake of some micronutrients was observed however, intake of vitamin C, potassium and calcium were not adequate among the respondent.

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PE3

Determination of Chemical and Anti-oxidant Properties of *Diospyros mespiliformis* SEED

***Gadanya, A.M., Ibrahim, I. and Taufiq, M.B**
Department of Biochemistry, Faculty of Basic Medical Sciences, Bayero University Kano, PMB 3011, Kano – Nigeria.
amgadanya.bch@buk.edu.ng

KEYWORDS: *Diospyros mespiliformis*, Nutritional, Anti-Nutritional, Anti-Oxidant

BACKGROUND AND OBJECTIVES

Food insecurity and scarcity have become a global problem confronting most countries of the world with devastating consequences such as mal-nutrition, starvation and hunger-related deaths. Increase in population, shortage of fertile land, high prices of available staples, and restrictions on importation of food amidst other numerous factors that made conventional agriculture in-sufficient to meet demands creating the problem of food insecurity and scarcity. Thus, access to adequate and nutritious food has become challenging for countries within Sub-Saharan Africa as well as other developing countries. It becomes relevant to introduce more plant foods in order to bridge the gap of alarming food shortage in human nutrition and this has aroused the attention of researchers throughout the world especially in Nigeria.

Diospyros mespiliformis is eaten as fruit and for medication by many African populations due to its nutritive and therapeutic properties. The present study analysed the proximate, mineral, anti-nutritional and anti-oxidant composition of *Diospyrosmespiliformis* seeds.

MATERIALS AND METHODS

Proximate composition (moisture, ash, fat, crude fiber and carbohydrate contents) of the seeds of *Diospyrosmespiliformis* plant were determined using the recommended methods[1] while crude protein content was determined by Kjeldahl method[2]. Mineral composition (K, Na, Mg, Ca, Zn) were determined using the atomic emission spectrometer procedures[1]. Anti-nutrients (tannins, phytate and flavonoids) andAnti-oxidant activity of the seed were also determined[3,4].

RESULTS AND DISCUSSION

Results of the study (table 1) revealed that,the seeds of *Diospyrosmespiliformis* contain carbohydrate (82.02 ± 0.01%),crude protein (5.44± 0.48%),crude fat (2.22 ± 0.08%) and fiber (2.09 ± 1.10%). It contain calcium (1.00 ± 0.03mg/100g), magnesium (0.80± 0.02mg/100g), zinc (0.14 ± 0.01mg/100g), potassium (2.40 ± 0.21mg/100g) and sodium (0.05mg/100g ± 0.01) within acceptable/safety limit of consumption.The seeds also were found to containflavonoid (27.96mg/100g ± 0.008mg/100g) and phytate (0.92 ±0.078mg/100g). The level of carbohydrate found in the seeds(82.02%) exceeded the levels reported in other tropical seeds like Tamarind seeds; 56.24% – 58.08% and defatted Parkiabiglobosa seeds; 22.7 ± 0.21% (Ogunyinka et al., 2016).

Table 1: Proximate composition of *Diospyrosmespiliformis* seeds

Parameters	Concentration (%)
Carbohydrate	82.02 ± 0.00
Crude protein	5.44± 0.48
Crude fat	2.22 ± 0.08
Crude ash	2.23 ± 1.14
Fiber	2.09 ± 1.10
Moisture	6.0± 0.08

Values are expressed as means ± standard deviation of three determinations

CONCLUSION AND RECOMMENDATIONS

This study has shown that *Diospyros mespiliformis* seed is a rich source of macro and micronutrients with low anti-nutrient level. It agrees favorably with those of other wild plants recommended as food supplement in literature and can be incorporated into diets to spare scarce of cereal grains during dry season. It is therefore suggested that, *Diospyros mespiliformis* seeds should be included in diet to supplement humans dieting nutritional need.

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OE4

Biological, Liver and Kidney Evaluation of Albino Rats Fed Bambara-Rice Diet Blends

: [1]**Ezeibe, C.P. and** [1]**Asumugha, V.U**
[1]*Department of Human Nutrition and Dietetics;*
Micheal Okpara University of Agriculture, Umudike, Abia State, Nigeria
Email: ezeibe.chinyere@mouau.edu.ng

KEYWORDS: Biological Evaluation, Fermentation, Bambara- Rice, Diet-blends

BACKGROUND AND OBJECTIVE:
The use of biological methods for evaluation of nutritional values of foods has been continually used in the field of nutrition. As stated by (1), nutritional quality of any protein food depends on two factors which are the balance of essential amino acid and digestibility. (2) identified several measurement scales and techniques used to evaluate the quality of protein. These methods are protein efficiency ratio (PER), biological value (BV), net protein utilization (NPU), protein digestibility and corrected amino acid score; and also nitrogen balance (NB).
This study therefore was designed to evaluate the protein quality of bambara-rice diet blends in the liver and kidney of albino rats fed the diet blends.

MATERIALS AND METHODS:
This study was an animal experimental study. Male albino weanling rats weighing 45-40g were used. The test diets were different flour blends of Bambara groundnut (fermented) and Uzuakoli local rice (R). Other nutrients such as minerals, vitamins, vegetable oils and sucrose were added to balance the diets. Meanwhile, BFE (Bambara groundnut at 48hr fermentation period) was selected for the diet formulation because of its desirable crude protein content and the ratio of the blends to rice were 80:20, 70:30, 60:40. Then, other composites from 24hr (BTF), 48hr (BFE), 72hr (BST) and zero hr, (BZE*- control) fermentation periods were at the ratio of 100:0 The animals were housed in a metabolic cages and screen-bottom type equipped to separate urine and faeces. The rats were fed both the test diets and control diets and deionised water ad libitum for 35 days. This study comprised a 28-day growth and 7-day balance period. The urine, faeces, liver and kidneys of the rats were collected and evaluated for the food and nitrogen (N) intake, faecal and urinary N, digested and retained N, biological value, net protein utilization and the moisture, weight and N content of the liver and kidneys. The mean standard error of mean and analysis of variance of the data obtained were statistically analysed using the SPSS version 20. Means were separated by Duncan's Multiple Range Test and significance judged at $P< 0.05$.

RESULTS AND DISCUSSION
: Food intake of the group of rats fed diet BFE_3: R had the highest value (75.98g). The N intake of group of rats fed diet BFE: 0 was the highest (3.59g) at $P<0.05$. The group fed diet BZE*: 0 had a higher faecal

and urinary value (2.56g and 0.38g). The higher N intake of the group of rats fed diet BFE_3: was as a result of their food intake and also of the protein content of the blend. The digested N, retained N, biological value (BV) and NPU of the group of rats fed diet BFE_2: R had the highest values respectively. Dry weight and moisture content of the liver of rats fed diet BFE_2: R were the highest (1.44g and 4.21g) respectively while the group fed diet BFE:0 had the highest N content. The dry weight of the kidney of rats fed diet BFE: 0, BST:0 and BZE*:0 had comparable values (0.20, 0.21 and 0.21g) respectively. The N content of those fed diet BST:0 had the highest value (3.16g) and BZE*: 0 the lowest (2.18g).

CONCLUSION:

The results obtained showed that all diets from BFE had the best nutritive quality values in all the parameters assessed while BZE* had the poorest values.

RECOMMENDATION:

Based on this work, it is established that 48hr fermentation period was the best period which could be used to improve the nutritional quality of Bambara groundnut and should be applied to other food products for better nutrition.

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OE5

IODINE CONTENT OF SOIL, MAIZE (*Zea mays*) AND RICE (*Oryza sativa*) FROM RURAL PART OF ANAMBRA STATE, NIGERIA

***[1]Okoroigwe, F. C [2] ; Ifeanyi-Uche,U.P and [3]Nweze,B. C**

(1) Okoroigwe, F.C. -Natural Science Unit, School of General Studies, University of Nigeria, Enugu Campus and Department of Nutrition and Dietetics, University of Nigeria, Nsukka.
(2) (2)Ifeanyi-Uche, U.P.- Department of Home Economics, Federal College Of Education Technical Umunze, Anambra State Nigeria
(3) Nweze, B. C. - Natural Science Unit, School of General Studies, University of Nigeria, Enugu Campus & Department of Food Sci and Tech, University of Nigeria, Nsukka

KEYWORDS: Biological Evaluation, Fermentation, Bambara- Rice, Diet-blends

BACKGROUND AND OBJECTIVE:

Good health cannot be achieved without healthy diet. Iodine is an essential trace element necessary for metabolism and overall health. Iodine deficiency leads to health problems known as iodine deficiency disorder (IDD). IDD results from inadequate intake of iodine or effect of thiocynate in foods such as cassava (1). The entire landscape of Nigeria predisposes the country to iodine deficiency disorders because of its proximity to the equator and the long months of rainfall spreading from April to November (2). In Nigeria as well as other parts of the world, the consumption of iodized salt to improve iodine intake has been encouraged.But local salts are still found in local markets especially in our study area showing that in 21st

century, some people in Ayamelum LGA, are still taking locally made salt. What formed the major source of iodine to the people of Ayamelum gave rise to this research. Also, efforts to improve the iodine intake of inhabitants of our study area must begin with a look at data on iodine content of local soil and locally cultivated and consumed staples. Data on iodine content of soil and food samples are relatively scarce. The aim of this study is to determine the iodine content of soil and commonly cultivated and consumed staples (rice and maize) in Ayamelum LGA of Anambra State, Nigeria.

MATERIALS AND METHODS:

Soil samples were collected from rice and maize farmlands. Rice and maize samples were bought from farmers that own the farmland where soil samples were collected. The samples were prepared and analyzed for iodine using alkaline dry ash method . Descriptive and correlation analysis were carried out using IBM SPSS (version 22).

Table 1: Iodine content of Soil, rice (*Oryva sativa*) and maize(Zea mays) according to communities(μg/g).

Communities	Soil	Soil iodine (	Rice	Rice Iodine	Maize	Maize iodine
(C)	no	mean±SD)	no	(mean±SD)	no	(mean±SD)
C1	3	8.1080±0.000	3	8.1056±0.003	3	8.1060±0.003
C2	3	10.9143±1.790	3	9.1043±0.064	3	9.0610±0.051
C3	3	13.9533±0.984	3	10.1193±0.011	3	10.0823±0.044
Total	9	10.9919±2.730	9	9.1098±0.873	9	9.0831±0.857

NB: Values are means of 3 determinations ± SD. C1,C2,C3 represent communities 1, 2 and 3, respectively.

CONCLUSION AND RECOMMENDATION

The iodine content of the soil was high. Because of the high level of soil iodine, the iodine content of rice and maize grown on the soil was also high. There is need to note that not all consumed iodine in diet are bioavailable for body use. Therefore, the iodine status of Ayamelum people cannot be concluded without further study using urine or blood samples to determine the adequacy of their iodine intake. Any nutritional intervention technique employed to raise iodine concentration of any environment will surely improve iodine content of food crops and iodine intake of the local population.

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OE6

Therapeutic Diets Prepared from Developed Recipes using Indigenous Foods for The Management of Diabetes and Arthritis among Adults in Aluu Community In Ikwerre Local Government Area of Rivers State.

Asouzu A.I[1] and Afieroho M.C*[1]

[1]*Department of Home Economics and Hospitality Management, Ignatius Ajuru University of Education, Rivers State, Nigeriamercyuzoka@yahoo.com*

KEYWORDS: Therapeutic Diet, Diabetes, Arthritis, Aluu Community.

BACKGROUND AND OBJECTIVE:
In the prevention and management of chronic diseases, intake of a healthy and adequate diet should be prioritized. This study prepared therapeutic diets from developed recipes using indigenous foods for the management of diseases such as diabetes and arthritis and evaluate the nutrient composition of the prepared diets.

MATERIALS AND METHODS:
Ten (10) therapeutic diets namely: sweet potatoes vegetable pudding (SPVP), fried tapioca salad (FTS), vigna pottage delicacy (VPD), steamed whole cowpea (SWC), pleurotus wheatmix flakes (PWF), corn garden egg pudding (CGP), papaya fruit salad (PFS), savory star ginger fruitveg drink (SSGFD), pumpkin squash cucumber salad (PSC) and avocado cucumber salad (ACS) were prepared from developed recipes. AOAC analytical standard was used in determining the nutrient compositions of the prepared therapeutic diets. The nine (9) point hedonic scale was used to evaluate the sensory characteristics of the prepared diets by 12 trained panelists. The data obtained was analyzed using one way analysis of variance.

REESULT AND DISCUSSION:
The study revealed that the therapeutic diets from developed recipes contained appreciable amount of nutrients especially vitamin C, fiber and protein with pleurotus wheatmix flakes (PWF) having the highest contents of fibre (3.74g) and vitamin C (147.89mg) in 217g serving portion. With reference to protein, steamed whole cowpea (SWC) diet had the highest content (3.90g per 217g portion size). Vigna pottage delicacy (VPD) had the highest content of vitamin E (28.08mg) and calcium (9.58mg) per 360g portion size. The carbohydrate and fat contents of the diets were low.

CONCLUSION AND RECOMMENDATIONS: These diets can be used to manage diabetes and arthritis and for improvement of general nutritional status. The study recommended the use of well combined indigenous foods for the management of diseases.

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OE7

A Cross Sectional Survey on Infant And Young Child Feeding Practices, Nutritional Status Of Children (0-24 Months) In Uyo Local Government Area Of Akwa Ibom State, Nigeria.

[1] Udoh, P.M. and [2] Isong, B.N.

Department of Home Economics, Nutrition and Dietetics, Faculty Of Agriculture. University of Uyo, Nigeria
oliviaaudoh60@gmail.com

KEYWORDS: Children, Malnutrition, Breastfeeding, Complementary Feeding.

BACKGROUND AND OBJECTIVE:
Infant and Young Child Feeding (IYCF) practices directly affect the nutritional status of children under two years and ultimately impacts on their survival (1). Malnutrition resulting from inappropriate feeding practices is a major problem among developing countries and has been responsible directly or indirectly for the 45 million deaths among under five (2). It is not clear whether the infant and young child feeding practices among mothers are sufficiently appropriate to support optimum growth and development of children in Nigeria. This survey was therefore designed to assess infant and young child feeding practices among children (0-24) months in Uyo Local Government Area, Akwa Ibom State.

MATERIALS AND METHODS:
This descriptive cross-sectional survey adopted a multistage simple random sampling technique to select 400 mother/child pair from the four wards of Uyo Local Government Area. A structured interviewer administered questionnaire was used to obtain information on socio economic characteristics, infant and young child feeding practices and anthropometric information of respondents. Information on the IYCF practices were obtained using the WHO/UNICEF recommended indicators for assessing infant and young child feeding practices. Anthropometric measurements of weight, height and mid upper arm circumference were taken using appropriate tools and procedures. Weight and height measurements were used to derive weight-for-age, height-for-age and weight-for-height indicators using the WHO Anthro Software version 3.2.2. Data were analyzed using descriptive statistics.

REESULT AND DISCUSSION:
Based on findings from this study, a total of 400 mother/child pairs with mean ages 29.27± 3.22 years old and 9.32±6.83 months participated in the study. Mothers were mostly Christians (99.0%), Ibibio (89.8%) with at least complete secondary school education (89.3%) and were either petty traders (20.3%), registered business owners (21.0%) and public servants (18.3%). The results of the IYCF practices and nutritional status are shown in the tables below.

Table 2: Nutritional Status of Children 0 – 24 months Old

Practices	Frequency	Percentage (%)
Early initiation of breastfeeding within the first one hour after birth	244	61.0
Breastfeeding first milk	238	59.5
General breastfeeding	397	99.3
Exclusive breastfeeding	108	27.0
Timely introduction of complementary feeding	143	35.7
Continued breastfeeding at one year	19	4.7
Minimum dietary diversity of children 6 – 24 months old	123	47.3

Table 2: Nutritional Status of Children 0 – 24 months Old

Indicator	Frequency	Percentages (%)
Wasting	34	9.0
Stunting	147	36.8
Underweight	47	11.9
MUAC		
Severe malnutrition	10	2.5
Moderate to acute malnutrition	37	9.3
At risk of malnutrition	88	22

CONCLUSION AND RECOMMENDATIONS:

Infant and young child feeding practices is sub optimal in Uyo Local Government Area. Effort should be intensified to reiterate the benefits of these practices and address the identified hindrances via nutrition education.

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OE8

Familiarity And Consumption Patterns Of Selected Indigenous Dishes Among Adolescents In Ikot Ekpene Local Government Area In Akwa Ibom State, Nigeria.

[1*]Ekerette, N.N., [1]Alozie, E.Y. and [1]Jimmy, C.I.

[1] *Department of Home Economics, Faculty of Agriculture, University of Uyo, Nigeria.*

**nekerette@gmail.com*

KEYWORDS: Adolescents; Indigenous Foods; Consumption Patterns.

BACKGROUND AND OBJECTIVE:

Adolescents usually find it challenging to adopt dietary patterns that guarantee adequate nutrition and good quality of life. They tend to base their intakes on energy dense snacks and beverages with little or no vegetables, fruits and other nutrients dense food groups. Hence they risk suffering from both micronutrient deficiencies and protein energy malnutrition (1, 2). Incorporating indigenous foods in dietary intakes can serve as a viable food based strategy to improve the quality of nutrition and mitigate the effects of nutritional deficiencies in all age groups (3). However, these foods rarely form part of dietary intakes in most populations. The extent to which adolescents are knowledgeable about most traditional and indigenous foods in various populations is not known. This study was designed to assess the familiarity and consumption patterns of selected indigenous dishes among adolescents in Ikot Ekpene Local Government Area (LGA) in Akwa Ibom State, Nigeria.

MATERIALS AND METHODS:

The study adopted a multistage sampling technique to select in-school adolescents, 10-19 years old from three public secondary schools within Ikot Ekpene LGA, Akwa Ibom State, Nigeria. Data was collected using an interviewer administered questionnaire. Selected indigenous recipes were prepared using information collected during focus group discussions and presented to respondents for identification- *Ibok Udia* (yam Pottage), *Otoh Mboro* (grated unripe banana pottage), *Ibok Ukom* (unripe banana pottage), *Ekpang nkwokwo* (grated cocoyam and water yam wrapped in fresh cocoyam leaves pottage), *Usung Ikpong* (pounded cocoyam), *Ibok anem* (pottage made with sweet yam), *Asa iwa* (grated cassava, wrapped in fresh cocoyam leaves pottage) *Ubeg Akpakpa* (corn dish made with whole grains), *Asa Akpakpa* (corn dish made with paste), *Ekoki* (steamed corn pudding) and *Edesi Ikong* (palm oil rice). Familiarity test was conducted using a 5 points knowledge scale. Frequency of consumption was assessed to describe consumption patterns. Results were presented as frequencies and percentages.

REESULT AND DISCUSSION:

A total of 191 adolescents, comprising of 59.0% males and 41.0% females with mean age of 14.5 years participated in the study. A total of 25.1%, 23.1%, 21.3% and 20.4% had poor knowledge of *Ekpang nkwukwo, Asa iwa, Usung ikpong and Edisi ikong* respectively. Results on consumption patterns are shown in table 1.

Table 1: Consumption patterns of Selected Indigenous dishes among in-school adolescents in Ikot Ekepene LGA

Foods	Never	1-3 times Monthly	Once	2-3 times Weekly	≥ 4 times	≥Once Daily
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Asa Akpakpa	7 (3.7)	12 (6.2)	20 (10.6)	120 (62.8)	10 (5.2)	22 (11.5)
Ekoki	4 (2.1)	38 (20.0)	24 (12.6)	89 (46.6)	27 (4.1)	9 (4.7)
Otoh Mboro	5 (2.6)	45 (10.6)	28 (14.7)	78 (40.9)	28 (14.7)	7 (3.7)
Ibok Ukom	4 (2.1)	63 (33.0)	7 (3.7)	97 (50.8)	13 (6.8)	7 (3.7)
Asa Iwa	10 (5.2)	73 (38.2)	27 (14.1)	54 (28.3)	20 (10.5)	7 (3.7)
Edesi Ikong	5 (2.6)	22 (11.5)	30 (15.7)	94 (49.2)	14 (7.3)	4 (2.1)

It appears adolescents in this study do not have preference for traditional and indigenous foods. Insufficient familiarity indicated in the findings suggests indigenous recipes rarely constitute important menu items for household nutrition among adolescents.

CONCLUSION AND RECOMMENDATİON:

Adequate knowledge of traditional foods is important for attaining desirable consumption patterns among adolescents in the region and should be promoted.

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PE9

Consumption Pattern of Fruits and Vegetables among Staff of University of Lagos, Lagos State

Florence N. Uchendu,

Department of Public Health, Faculty of Health Sciences, National Open University of Nigeria, Jabi, Abuja, Nigeria

uchendu_flo@yahoo.com

KEYWORDS: Fruits, Vegetables, Academia, Consumption Pattern

BACKGROUND

Non-communicable diseases (NCDs) account for 29 % deaths in Nigeria (WHO, 2016). Planetary health diets which are diets rich in fruits and vegetables have been recommended for the prevention of NCDs (The Eat-Lancet Commission, 2020). Few studies have investigated the fruit and vegetable consumption pattern of staff in an academic environment. The study aimed at assessing the consumption pattern of fruits and vegetables among staff of University of Lagos, Lagos State.

METHODS

A multi-stage sampling technique was used to select 952 respondents among the staff of University of Lagos. An adapted pre-tested World Health Organization STEPwise (WHO-STEPwise) questionnaire was used to collect socio-demographic information and consumption pattern of fruits and vegetables among the staff. Data was analysed at $p<0.05$.

DATA COLLECTION:

A cross-sectional study was carried out. A multi-stage sampling technique was used to select 952 respondents among the staff of University of Lagos. An adapted pre-tested World Health Organisation STEPwise (WHO-STEPwise) questionnaire was used to collect socio-demographic information and consumption pattern of fruits and vegetables among the staff.

INCLUSION CRITERIA

Only permanent staff 18 years and above were selected for the study.

STATISTICAL ANALYSIS

Data was analysed using descriptive statistics, T-test and Pearson Chi-Square at $p<0.05$.

RESULTS

Staff mean age was 45.4±9.660 years. Male (61.1%) and Female (38.9 %). Fruits were consumed ≤ 3 days/week by 42.2% and ≥ 3 days/week by 57.8 %. Vegetables were consumed ≤ 3 days/week by 43.4% and ≥ 3 days/week by 56.6%. Fruit consumption was statistically significant with age, education and marital status while vegetable consumption was statistically significant with education ($p<0.05$).

DISCUSSION

While fruit consumption increased as age and education increased, vegetable consumption decreased as age increased. Fruit and vegetable consumption among the staff were average. Low consumption of fruits and vegetables was found among more than 40 % of the staff. Married staff (84.4 %) consumed fruits more than others ($p<0.05$). Factors that influenced fruit consumption were age, education and marital status while only education influenced vegetable consumption. Nutrition education and awareness is crucial in this study population.

CONCLUSION: Staff of the University had average consumption pattern for fruits and vegetables. Nutrition education and awareness is crucial.

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OE10

Hiv Status, Breast Feeding Pattern and Intake of Antiretroviral Drugs Among Infants (0-12 Months) of Hiv Positive Mothers at Federal Medical Centre Owerri, Imo State, Nigeria

Anoshirike, Cyril O.[1]; Anoshirike, Kelechi M[2*]; Onyeme Chioma[2]

[1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka [2]Department of Nutrition and Dietetics, Imo State Polytechnic, Umuagwo, Owerri

ogbonnakelechi611@gmail.com

KEYWORDS: Hiv, Breast Feeding, Antiretroviral Drugs, Infants

BACKGROUND AND OBJECTIVE:

Decision and practices of breast feeding among HIV positive mothers is a critical issue with special concern globally, including Nigeria. The challenges HIV mothers faced in balancing the risk of HIV transmission from mother to the child through breastfeeding and risk of malnutrition and death from not breastfeeding are often neglected. Hence, the study assessed the HIV Status, breast feeding pattern and intake of antiretroviral drugs among infants (0-12 months) of HIV positive mothers at Federal Medical Centre Owerri, Imo State, Nigeria.

MATERIALS AND METHODS:

A cross sectional study was designed to generate data from 95 HIV Positive mothers and their child pairs randomly in Heart to Heart clinic, Federal Medical Centre, Owerri. A structured questionnaire was administered to mothers to elicit information on their demographic characteristics, Anti-Retroviral drugs intake and breastfeeding practices on their children. HIV status of both the mother and child pair were obtained from HIV test carried on the subjects during their visit to clinic. Data was analyzed using SPSS version 23. Statistical analysis was carried out using chi-square test for association analysis of variables. Statistical significant was accepted at $p<0.05$.

RESULTS AND DISCUSSIONS:

About 88.5% of the mothers living with HIV aged between 15 to 34 years, 58.9% were married, and 74.4% had tertiary education qualifications, 40.4% were civil servants, and 53.8% earned a monthly income of less than ₦50,000. About 81.1% of the children of HIV positive mothers were tested positive to HIV, the high prevalence of mother to child transmission of HIV in this study could be attributed to poor optimal infant and young child feeding practices, poor intake of antiretroviral drugs by mothers, which could have been prevented through compliance to WHO recommendation guideline [1]. Attention needs to be given on practice of breastfeeding according to WHO recommendation on children exposed to HIV to prevent malnutrition, boost their immune system and avert degeneration to AIDs. Hence, improved healthy eating pattern is essential to both mothers and their children. About 46.3% of mothers breastfeed their children and 36.8% breastfed exclusively for the first six months while taking antiretroviral drugs., The rate of exclusive breastfeeding in this study is low and is one of the major cause of malnutrition which worsen in the case of infection such as HIV. About 83.2% of the children were on antiretroviral drugs. This confirmed the high prevalence of HIV positive case among children. About 42.1% of the mothers agreed that the child should be breast feed exclusively for 6 months before introducing enriched complementary feeding. There is no significant relationship between the Children's HIV Status and children that were breastfed ($x^2=0.763$; $p=0.383$) and who were exclusively breastfed for the first six months while taking antiretroviral drugs ($x^2=0.552$; $p=0.458$), but there was a significant relationship between children's HIV status and children that took antiretroviral drugs ($x^2=17.433$; $p<0.001$).

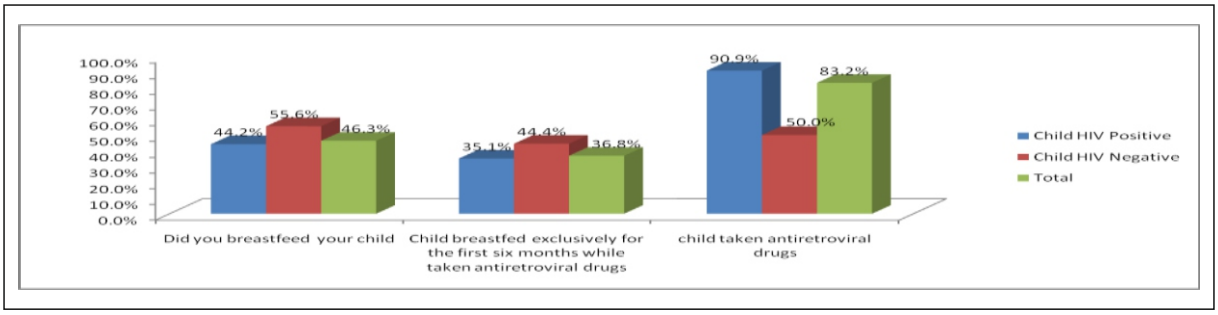

Figure 1: Relationship between breastfeeding and antiretroviral drugs intake among children and their HIV Status.

CONCLUSION AND RECOMMENDATIONS:

The study shows that 8 out of 10 children of HIV positive mothers were HIV positive with majority on antiretroviral drugs. However, less than half of the children who were breastfed/ exclusively breastfeed were given antiretroviral drugs. Hence, there is need to reinforce nutrition education among mothers living with HIV on WHO recommendation guideline for infant and young child feeding practices in the context HIV positive mothers.

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PE11

Chemical Composition and Sensory Properties of Complementary Gruel Made from Processed Maize (*zea Mays*) and Soy Beans (*glycine Max L.*) Composite Flour, Banana Pulp (*muna Acuminate*) and Palm Oil (elaeis Guineensis)

Ezeanolue I.R[1], Anoshirike C.O[1*] & Onuoha N.O[1]

[1]*Department of Nutrition and Dietetics, Faculty of Agriculture, University of Nigeria Nsukka, Nigeria*
cyril.anoshirike@unn.edu.ng

KEYWORD: Complementary, Gruel, Composite flour, Processing technique.

BACKGROUND OBJECTIVE:

Optimal infant feeding practice is an important factor in determining growth and development of a child with complementary food a major contributor to the nutritional status (growth and development), health and general well-being of a child. Locally made complementary food seem to be the most culturally acceptable, potentially cheap and cost effective way of improving complementary food quality in malnourished infant and young children populations. The challenges in the use of locally made complementary food is the safety and preparation to ensure both nutrient quality and quantity. Hence, the

study determined the chemical composition and sensory properties of complementary gruel made from processed maize and soybeans composite flour, banana pulp and palm oil.

MATERIALS AND METHOD: Dried yellow maize grains, soy beans grains, riped banana and palm oil for the complementary food formulation were purchased from a local market in Nsukka (Ogige Market) Nigeria. The yellow maize and soy beans grains were sorted washed and subjected to different processing methods such as soaking, sprouting and fermentation. While soyabean was sorted, washed, soaked, sprouted and fermented before they were boiled, dehulled. All of the processed grain were sun dried and milled into flour samples and packaged separately in a well labeled airtight bag. Four composite flour samples were formulated from: soaked maize and soybean flour; soaked and sprouted maize and soybean flour; soaked and fermented maize and soybean flour; and soaked, sprouted and fermented maize and soybean flour. And the four complementary food samples were formulated from the composite flour, banana pulp and red palm oil in the ratio of 55% maize flour, 20% soy beans flour, 20% banana pulp and 5% red palm oil to produce a mixed samples used to prepare complementary food gruels: MS1 = Soaked sample of the gruel; MS2 = Soaked + sprouted sample of the gruel; MS3 = Soaked +fermented ample of the gruel; MS4 = Soaked + sprouted + fermented sample of the gruel and were subjected to chemical analysis and sensory evaluation using standard methods.
The data was analyzed using Statistical Product for Service Solution (SPSS) version 22, and statistical analysis was done using ANOVA and the mean was separated with Duncan post hoc multiple range test, significance level accepted at (P 0.05).

RESULTS AND DISCUSSION: Complementary feeding furnishes the child energy and basic nutrients required for growth and development. From the result it was observed that complementary food gruel made from Soaked + sprouted + fermented sample of the gruel (MS4) shows increased protein and ash content, iron, magnesium and zinc. Sprouting reduces carbohydrate content and increases protein content. While the complementary food gruel made from soaked sample of the gruel (MS1) had the higher carbohydrate and energy value. This implies that they complementary food gruels formulated provide sufficient energy, protein and micronutrients to meet a growing child's nutritional needs. 450ml portion of the formulated complementary gruel furnishes the infants aged 6 to 8 months with energy (207 to 256 kcal) and protein (5 to 6.66 g), vitamin A (115.2 to 180.68 mcg), vitamin C (91.4 to 147.42mg), vitamin B3 (45 to 180 mcg), vitamin B9 (40,410 to 48,555 mcg), Iron (1.7 to 3.1mg), calcium (139.3 to 157.9 mg), Magnesium (88.79 to 139.05 mg) and Zinc (135 to 360 mcg) per day which in line with WHO (1) (2) recommendation for energy and nutrients needs from complementary foods for healthy and breast fed infants 6 to 8 months per day. The study revealed that complementary food gruel made from soaked and sprouted sample of the gruel (MS2) had the higher Calcium value and complementary food gruel made from soaked, sprouted and fermented maize and soyabean shows a decreased in the carbohydrate and energy content, but increases the protein, ash, iron, magnesium, zinc and moisture content. The traditional processing methods adopted in the preparation of these complementary foods such as soaking, germination and fermentation decreased the inhibitory effect of these antinutrients on mineral absorption (3). This could be applied to the low micronutrient content of the formulated gruel. Complementary gruel made from soaked and fermented maize-soybean composite flour (Sample MS3) ranked highest in taste, colour and consistency.

Table 1: Energy and Proximate composition of the complementary gruel made from processed maize and soybean flours, banana pulp and palm oil per 100g as consumed.

Samples	Energy (kcal)	Protein (%)	Moisture (%)	Fat (%)	Ash (%)	Fiber (%)	Carbohydrate (%)
MS1	$56.88^{c} \pm 0.28$	$1.11^{a} \pm 0.01$	$85.55^{a} \pm 0.06$	Trace	$0.23^{a} \pm 0.01$	Trace	$13.12^{c} \pm 0.08$
MS2	$55.96^{bc} \pm 0.96$	$1.32^{b} \pm 0.06$	$87.75^{ab} \pm 0.22$	Trace	$0.27^{ab} \pm 0.02$	Trace	$12.67^{bc} \pm 0.18$
MS3	$54.22^{b} \pm 1.33$	$1.13^{a} \pm 0.01$	$86.25^{b} \pm 0.35$	Trace	$0.20^{b} \pm 0.01$	Trace	$12.43^{b} \pm 0.34$
MS4	$46.00^{a} \pm 0.17$	$1.48^{c} \pm 0.01$	$88.01^{c} \pm 0.28$	Trace	$0.49^{c} \pm 0.01$	Trace	$10.02^{a} \pm 0.06$

Table 2: Mineral composition of the complementary gruel made from processed maize and soybean flours, banana pulp and palm oil per 100g as consumed.

Samples	Iron (mg/100g)	Calcium(mg/100g)	Magnesium(mg/100g)	Zinc(mg/100g)
MS1	$0.37^{a} \pm 0.01$	$34.88^{a} \pm 4.88$	$19.78^{a} \pm 1.30$	$0.03^{a} \pm 0.001$
MS2	$0.54^{b} \pm 0.01$	$35.08^{a} \pm 4.84$	$25.17^{b} \pm 0.35$	$0.03^{a} \pm 0.001$
MS3	$0.39^{a} \pm 0.03$	$30.96^{a} \pm 0.23$	$19.73^{a} \pm 1.50$	$0.03^{a} \pm 0.001$
MS4	$0.69^{c} \pm 0.03$	$34.94^{a} \pm 4.90$	$30.90^{c} \pm 0.30$	$0.08^{b} \pm 0.021$

Keys: MS1 = Soaked sample of the gruel; MS2 = Soaked + sprouted sample of the gruel; MS3 =Soaked +fermented ample of the gruel; MS4 = Soaked + sprouted + fermented sample of the gruel; Mean value with same alphabet superscript along the column means no significant difference ($P > 0.05$) in their mean value, while those with different alphabet superscript along the column means there is significant difference ($P < 0.05$) in their mean.

CONCLUSION/ RECOMMENDATION: The study shows that complementary food gruel made from soaking, sprouting and fermentation of maize and soyabean improved nutrient content such as protein, ash, iron, magnesium, zinc content of the complementary food gruel. Cost effective, good nutreints quality and safe complementary foods could be made from locally available food sources such as maize, soyabean, banana and red palm oil through the application of different processing techniques. Locally made complementary food should be encouraged in promoting optimal nutrition among infant and young children between the age of 6 to 24 months.

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OE12

Evaluation of Nutritional Quality of an Infant Weaning Formula from Underutilized Protein Source

Petrol, B.B[1]. Mohammed, Z. K[2], Umar M. U[1] and Hashim, H[3]

[1]*Department of Biochemistry, University of Maiduguri, Nigeria,*

[2]*Department of Biochemistry, Kaduna State University,* [3]*Department of Biochemistry, Yobe State University.*

bintubukar@yahoo.com

KEYWORDS: Infant Weaning Formula, Tiger Nut Flour, Cowpea Flour, Chemical Composition.

BACKGROUND AND OBJECTIVE:

Traditional Infant Formula in Nigeria are produced from mono-cereal grains prepared from either maize, millet or sorghum referred to as "Ogi or Akamu", which is of poor nutritional value [1]. When locally available cereals are subjected to some processing techniques and supplemented with legumes (rich in essential amino acids) which are a good source of protein that will give rise to an infant weaning formula which is easily digestible and acceptable to children [2,3]. The aim of this study is to produce a cereal/legume and tuber vegetable infant weaning diet using yellow maize, cowpea and tiger nut.

MATERIALS AND METHODS:

Cereal/legume/tuber vegetable infant weaning diet was produced using in a 60:20:20 ratio. The yellow maize was fermented for 72hours to produce Akamu. Standard methods were used for the determination of pH, titratable acidity, chemical composition and in vitro protein digestibility of the infant weaning meal.

RESULTS AND DISCUSSIONS:

Fermentation was found to cause a reduction in pH with time, the change in pH from 0-72 hours resulted in a pH drop from (5.76 to 3.5) Table 1. The infant weaning formula has a moisture content of (2.01±0.07%) and commercial control (frisocream®) has a moisture content of (2.0%). Result of the crude protein of the infant weaning formula (16.9±0.03%) was slightly higher than Frisocream® (15.3%). The carbohydrate of the infant weaning formula (82.3± 0.06%) was below the values of Frisocream® (445%). The *in vitro* protein digestibility of the infant weaning formula significantly increased with time Table 2. The low moisture content observed indicates that the infant weaning diet will have a good keeping quality. The high protein of the infant weaning diet may be due to the use of legume/tuber vegetable as fortifying agent and has been reported to improve the protein content of cereal-based diets [1].

Table 1: pH and Titratable Acidity of Yellow Maize at 72 hours of Fermentation

Hours	Ph	TA (g lactic acid/100g)
0	5.76 ± 0.15^{a}	0.96 ± 0.11^{a}
24	5.0 ± 0.11^{b}	1.06 ± 0.11^{a}
48	4.1 ± 0.15^{c}	1.9 ± 0.17^{b}
72	3.5 ± 0.05^{d}	2.5 ± 0.10^{c}

Values are mean ± standard deviation of three determinants. 60g yellow maize, 20g cowpea and 20g tiger nut. Means with different superscripts in a column for a sample are significantly different ($p<0.05$).

Table 2. Proximate Composition (%) of the Infant Weaning Diet Compared with a Commercial Weaning Meal Frisocrem® (rice)

Parameters	Yellow Maize, Cowpea and Tiger nut	Frisocrem®
Dry matter	94.65 ± 0.13	ND
Moisture	2.01± 0.07	2.0
Crude protein	16.9 ± 0.03	16.3
Ether Extract	9.94 ± 0.06	13.2
Crude fiber	4.94 ± 0.06	ND
Ash	2.98 ± 0.02	ND
Carbohydrate	82.3 ± 0.06	445

Values are recorded as mean ±SD of three determinants.
ND-Not Determined

CONCLUSION AND RECOMMENDATION:
The results have shown that the infant weaning diet produced from maize, tiger nut and cowpea had a low moisture content and a high protein which was comparable to the commercial weaning food cerelac®, indicating that the underutilized crops can be used to produce infant weaning diets. It is recommended for inclusion of bambaranut to the weaning diet.

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OE13

Protein Quality of Biscuits produced from Millet and Mung bean Flour blends

***Okpala, L. C. and Amagu, P. U.**
Department of Food Science and Technology, Ebonyi State University, Abakalikiicokpala7@gmail.com

KEYWORDS: Biscuits, Amino Acids, Millet, Mung Beans

BACKGROUND AND OBJECTIVE:

Biscuits are snacks produced from wheat flour which is deficient in lysine, threonine and tryptophan. If the nutritional quality of biscuits could be enhanced, biscuits could serve as a means of combating malnutrition. Millet proteins are good sources of essential amino acids such as methionine and cysteine. Mung bean (*Vigna radiate (L) Wilczek*) is a legume with a protein content which is twofold higher than in cereals, with a lower storage protein content (7-10%) [1]. The objective of this study was to produce and evaluate the protein quality of biscuits made from millet and mung bean flour blends using data obtained from the amino acid profiles of the biscuits produced..

MATERIALS AND METHODS:

Pearl millet grains, mung bean seeds and other ingredients used in producing the biscuits were obtained from a retail outlet in Enugu State, Nigeria. Millet (ML) and mung bean (MB) flours were prepared by sorting and cleaning each of the grains after which they were separately milled into flour and sieved to pass through a 100 μm mesh sieve. The flours were blended in the following ratios: 25ML:75MB, 50ML:50MB; 75ML:25MB while 100% wheat served as the control. Biscuits were produced as described by Okpala *et al*. [2].

AMINO ACID PROFILE DETERMINATION:

The amino acid profile of the sample was determined using the method described by Benitez [3]. Values obtained were used to calculate: Essential Amino Acid and Index (EAAI), Predicted Protein Efficiency (P-PER), Predicted Biological Value (BV) and Nutritional index (NI)

RESULTS AND DISCUSSSION

The protein quality of the biscuit samples is presented in Table 1.

Table 1: Protein quality indices of cookies produced from millet and mung bean flour blends

Parameters	75ML:25MB	50ML:50MB	25ML:75MB	100W	MEAN	S.D	CV%
EAAI (%)	71.36	82.45	79.44	67.32	75.38	8.54	11.33
BV(%)	66.08	78.17	74.89	61.68	70.55	9.18	13.01
PER	2.33	2.62	2.67	2.29	2.84	0.25	10.18
Nutritional Index (%)	10.67	13.17	15.99	10.84	12.91	2.30	17.82

ML : millet, MB: Mung bean

Among the ten essential amino acids observed in the biscuits, leucine had the highest concentration, while tryptophan had the least concentration. In terms of the non-essential amino acids in the biscuits, glutamic acid had the highest concentration, while cysteine had the least concentration. Biscuits made from 75ML: 25MB had the highest concentration of all the amino acids, and was closely followed by the biscuits containing 50% and 25% millet flour respectively. The least concentrations of amino acids were obtained from biscuits made from wheat flour (control). Biscuits produced from 50ML: 50 MB had the highest protein quality while the control (100W) had the least quality observed. Biscuits made from ML:MB blends were all superior in quality to wheat biscuits. Ijarotimi and Keshinro [4] reported that BV which ranges between 70 and 100% usually suggests good protein quality. Biscuits made with 25- 50% millet flour had BV ranging between 70-100%. Friedman [5] reported that PER values lower than 1.50 are indicative of low protein quality while values higher than 2.00 indicate high protein quality. All the biscuits had values above 2.00 which suggest good protein quality. The nutritional index (NI) obtained for most of the biscuits were higher than 13.0% recommended for infants and 14.0% for children with respect to protein content respectively.

CONCLUSION AND RECOMMENDATION

Biscuits of good protein quality can be produced from millet and mung bean flour blends. It is recommended that the ratio of 50ML: 50MB be used for the production of biscuits which may go a long way in combating malnutrition.

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OE15

Grub and Pulse-Based Ready-to-use Therapeutic Food as an Alternative to Standard Milk and Peanut Paste-Based formulation for Treating Childhood Malnutrition

Fagbola T.E.[1], Oyebamiji E.A.[2], Dr. Adepoju O.T.[3], Oduneye T.M[4].

[1,2,4]Dietetic Department, University College Hospital, Ibadan, Oyo-State, Nigeria,

[3]Human Nutrition and Dietetics Department, University of Ibadan, Oyo-State, Nigeria

topefagbola7@gmail.com

KEYWORDS: Ready-to-Use-Therapeutic Food (RUTF), Malnutrition, Grub, Pulses.

BACKGROUND AND OBJECTIVE:

Malnutrition contributes to childhood morbidity and mortality in sub-Saharan Africa (1). The nutrient targets for severe acute malnourished (SAM) children are focused on energy provision and addressing micronutrient deficiencies (2), using Ready-to-use-therapeutic food (RUTF) for treatment of SAM which proved to be effective in its management, however, problem that arises in distribution of standard RUTF leads to its periodic unavailability in vulnerable communities thus undermining its effectiveness in combating malnutrition (3). This study aims to formulate a locally made RUTF, examine its nutritional composition and assess its acceptability.

MATERIALS AND METHODS:

Two samples of formulated Grub and Pulse based RUTF paste were prepared by varying the pulse component of each sample. Nutrient composition of the two formulated RUTF pastes (sample A; *Brown beans 15%* & sample B; *Bambara nut 15%*) and standard RUTF paste were analysed (i.e. Proximate, Minerals, and Vitamin A) in triplicate using the standard AOAC methods. Thirty semi-trained panellists were recruited for sensory evaluation. Three tests (discriminatory, descriptive and 9-point hedonic test) were used to assess the acceptability of the formulated samples. Data were analysed using descriptive statistics and ANOVA, and significance level set at $p < 0.05$.

RESULTS AND DISCUSSSION

Standard RUTF (which is the control) was significantly higher in calorie content than the two formulated samples. This is primarily due to its significant higher fat content and lower moisture content compared to that of the formulated samples. Likewise, Standard RUTF is higher in protein, zinc, iron, calcium and phosphorus than the two formulated samples. However, it is lower in Vitamin A and Carbohydrate ($p<0.05$) while Grub-Bambara Nut-Based RUTF was highest in Vitamin A content ($p<0.05$). Considering acceptability, the formulated samples were as equally acceptable as the standard RUTF in all sensory parameters examined except appearance, aroma, and viscosity where the formulated samples trailed the standard sample.

Proximate and Selected Micronutrient Composition of Grub-Brown Beans-Based, Grub-Bambara Nut-Based and Standard (Peanut-Based) Ready-To-Use Therapeutic Feeds

	Samples			*P*-value[¶]
Nutrient (per 100g)	**A**	**B**	**C**	
Protein (g)	6.51 ± 0.20[c] *	11.10 ± 0.47[b]	13.91 ± 0.09[a]	**.000**
Fat (g)	9.90 ± 0.04[c]	14.10 ± 0.21[b]	33.38 ± 0.55[a]	**.000**
Moisture (g)	13.41 ± 0.07[a]	7.01 ± 1.45[b]	1.78 ± 0.22[c]	**.000**
Dry Matter (g)	86.59 ± 0.08	93.49 ± 0.41	98.22 ± 0.22	**.000**
Carbohydrate (g)	68.35 ± 0.21[a]	65.44 ± 0.35[b]	45.04 ± 3.35[c]	**.000**
Energy (Kcal)	388.61 ± 0.32[c]	433.04 ± 2.36[b]	536.22 ± 6.06[a]	**.000**
Vitamin A (μg)	1968.47 ± 1.05[a]	2004.49 ± 12.77[a]	998 ± 106.78[b]	**.000**
Calcium (mg)	171.83 ± 5.19[b]	202.50 ± 9.48[b]	424.00 ± 121.31[a]	**.000**
Phosphorus (mg)	310.33 ± 5.95[b]	341.83 ± 6.91[b]	543.67 ± 52.00[a]	**.000**
Iron (mg)	8.68 ± 0.05[b]	10.85 ± 0.42[a]	11.65 ± 1.20[a]	**.000**
Zinc (mg)	3.20 ± 0.05[c]	5.13 ± 0.90[b]	12.33 ± 1.28[a]	**.000**

Sample A – ***Grub-Brown Beans-Based RUTF*** (N = 6), Sample B – ***Grub-Bambara Nut-Based RUTF*** (N = 6) Sample C – ***Standard (Milk Peanut-Based) RUTF (eeZeePaste™)*** (N = 3)

* Mean ± SD; [¶] One-Way ANOVA, $P < 0.05$

[a, b, c] Levels of significant difference; Duncan, (Games-Howell for *Moisture*)

CONCLUSION AND RECOMMENDATION:

The energy content of the formulated samples was reasonably high, though still lower than the standard sample. The carbohydrate and Vitamin A content of the formulated samples were significantly higher than that of standard RUTF. Clinical study is recommended to be carried out to examine the effectiveness of the formulated samples especially the Bambara nut samples.

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OE16

Impact of homestead gardening on food eating pattern and nutritional status of vulnerable household members in Calabar, Cross River State, Nigeria.

Francis Ogum, Aburime Lilian
Department of Human Nutrition and Dietetics, University of Calabar, Calabar Cross River State.
francojustice88@yahoo.com
francojustice88@gmail.co.

KEYWORDS: Homestead-gardening, Orphan and Vulnerable -Children (OVC), Malnutrition, Household-food-security

BACKGROUND:

Micronutrient deficiencies (MNDs)- chronic lack of vitamins and minerals and constitute a huge public health problem. MNDs have severe health **consequences** and are particularly harmful during early **childhood** due to their impact on the physical and cognitive development. Micronutrient deficiencies can also be associated with metabolic problems, but are often linked with non-diversified food intake pattern that prevent adequate intake of one or many micronutrients. Nigeria is experiencing a triple burden of malnutrition, where undernutrition, including micronutrient deficiencies, exists alongside overweight, obesity and diet-related non-communicable diseases. Children and women of reproductive age are also vulnerable due increase requirement of micronutrient for growth and physiological activities. Data on micronutrient deficiency status is limited, and the available summary report show that, women and girls also experience high rates of malnutrition resulting from micronutrient deficiency, with 58% of women found to be anaemic (Nutrition International, 2021).

While the poverty implications of vulnerable households have been widely studied in different developing countries, much less is known about the impact of homestead gardening on household food security and nutrition. Diversifying crop production for vulnerable households can increase their access to nutritious foods and the stability of food supply. Dietary diversity takes care of nutritional needs of households and increase access to fruits and vegetables which is one of the most sustainable ways to reduce and prevent some aspect of undernutrition such as micronutrients deficiencies in a resource poor communities. The priority area focuses on increasing the production of fruits and vegetables and other bio-fortified rich stable foods such as; orange flesh sweet potatoes, vitamin A cassava and provitamin maize through a sustainable means like the homestead garden. Against this background, that a donor-funded project implemented nutrition relevant interventions to address the gaps of nutritional deficiencies and vulnerability to HIV among most vulnerable households in order to build resilience to shock.

OBJECTIVES:

The objective of this study is to demonstrate that dietary diversification through homestead gardening reduced undernutrition amongst vulnerable household in Calabar, Nigeria.

METHODOLOGY:

This was an exploratory study using both qualitative and quantitative methods. At enrolment, a baseline nutrition assessment was conducted for enrolled vulnerable households' members using national OVC nutrition assessment form. Information was obtained using food frequency questionnaire (FFQ) and was documented on the nutrition assessment form for the identified households. The assessment result was used to categorize dietary pattern and nutritional status after conducting anthropometric measurement of the

eligible household members. The caregivers who were interviewed using the FFQ, also received nutritional counseling and attended food cooking demonstration sessions with the aim of adopting a standard recipe to improve their daily dietary intake by consuming diversified locally available and nutritious food. A repeat nutritional assessment was conducted six months after the baseline using national OVC nutrition assessment form to collect information using the food frequency questionnaire (FFQ).

RESULT:

A total of 330 caregivers (Male 36, Female 294) were assessed at baseline and result shows that, 221.1 which represents 67% responded. Findings also shows that, members of their households often go to sleep hungry because there was no food to eat, 19% (n=62.7) responded; household members go a whole day and night without eating anything because there was no enough food, while 14% (n=46.2) responded; households' members consumed vitamin A-rich foods protein-rich foods and iron-rich foods.

Following nutrition intervention for more than six months, nutrition follow assessment was conducted using food frequency questionnaire (FFQ) and results showed that; out of the 330 caregivers supported with agricultural inputs to establish homestead gardens and attended food cooking demonstration sessions and received dietary counselling. Result shows that, 98% (n=323.4) households now have enough vitamin A-rich foods, protein-rich foods and iron-rich foods to eat without going to sleep hungry, while the remaining 2% (n=6.6) who do not establish homestead garden having received agricultural inputs, dietary counselling and attended food cooking demonstration sessions still reported household members go a whole day and night without eating anything because there was not enough food to eat or go to sleep hungry because there was no food to eat.

CONCLUSION:

Nutrition -agriculture sensitive services provided to vulnerable households' member to establish homestead gardens has significantly improved food access which is the physical or economic access to foods by individuals or households, food utilization which focuses on what and how they eat and covers the food preparation method and food choices to meet dietary needs for a productive and healthy life. This sustainable nutrition-agriculture approach is therefore recommended to ensure access to safe and nutritious food, build resilience to vulnerability, shock and stress and a shift to sustainable consumption patterns to minimize the high rate of "hidden hunger" (micronutrients deficiencies) among women of child bearing age and other household members in a resource poor communities following program intervention.

OE17

Glycemic Response of Swallows made from Yellow and White-Fleshed Cassava

***Chukwu C.C.[1], Ugwuoti R.C.[1], Nwoye A.J.[1], Okwara C.C.[1,2], Maduforo A.N.[2]**

[1]*Department of Nutrition and Dietetics, University of Nigeria Teaching Hospital,*

[2]*Department of Nutrition and Dietetics, University of Nigeria Nsukka*

**chimsben1@gmail.com*[1]

KEYWORDS: Cassava**,** Glycemic Response, Glycermic Index, Glycemic Load.

BACKGROUND AND OBJECTIVES

Cassava (*Manihot esculenta Crantz*) is one of the staple food crops in tropical parts of the world with Nigeria as the world's largest producer [1]. Certain carbohydrate foods are digested rapidly releasing glucose into the blood stream where as some are digested slowly releasing glucose slowly into the blood stream [2]. Glycaemic response of foods has always been a controversial issue in the management of persons with diabetes mellitus and there are a lot of speculations on the differences in the glycaemic response of swallows made from cassava. There is paucity of studies on the glycaemic response of swallow made from pro-vitamin A cassava variety. The differences in the glycaemic response of the common white cassava swallows and that of the provitamin A variety is unknown. This study therefore determined the glycemic response of swallow made from yellow- and white-fleshed cassava

MATERIALS AND METHOD

White and Pro-vitamin A fortified (yellow) cassava (*Manihot Sp*) tubers were harvested from a farm in Enugu East local government area, Enugu state, Nigeria. Healthy whole tubers were sorted, peeled and washed. The fresh pro-vitamin A tubers were processed into Garri and *Akpu* while fresh white cassava tubers were processed into White garri, Yellow garri and *Akpu*. Avaliable carbohydrate content of the samples were determined using phenol sulphuric method. The weight of each test meal that will give about 50g available carbohydrate, 90% (45g) from Swallow and 10% (5g) from standard soup was used. Standardized Okro soup was used as the standard soup. Ethical approval for the use of human subjects was obtained from University of Nigeria Teaching Hospital. Written informed consent was sought from participants. Participation was voluntary and withdrawal at any stage was allowed. The glycemic response was done using the Food Agriculture Organization protocols (3) and the glycemic index and load was calculated using standard formula (3). Descriptive statistics (mean and standard deviation) were used to present the glycemic response data obtained. A probability value <0.05 was considered significant.

RESULTS AND DISCUSION

Available carbohydrate ranged from 3.04g/100g in Okra soup to 23.50g/100g in Akpu white. The glycemic index of the test meals was 56 for Akpu white with okra soup, 65 for Akpu pro-vitamin A with Okra soup, 30 for white garri with okra soup, 3 for yellow garri with okra soup and Pro-vitamin A garri with okra soup. Regular intake of high glycermic foods spikes blood sugar levels and on a long run could result in metabolic diseases like type 2 diabetes and obesity (2). Yellow garri with okra soup had the lowest glycemic index, which could result from the addition of oil while processing the garri. Oils are proven to influence the post prandial glycemic response by causing prolong delay in postprandial glucose response.

Table 1: Available carbohydrate composition of test diets.

Test diets	Available carbohydrate (g/100g)
Cooked white garri	$20.65^{b}\pm0.32$
Cooked yellow garri	$23.12^{c}\pm0.23$
Cooked pro-vitamin A garri	$21.23^{b}\pm0.14$
Akpu white	$23.50^{c}\pm0.09$
Akpu pro-vitamin A	$20.88^{b}\pm0.95$
Okra Soup	$3.04^{a}+0.51$

Samples were analyzed in triplicates. Mean values with different superscript a – c in columns significantly ($p < 0.05$) differed

Table 2: Mean values of body parameters of the respondents for glycemic response evaluation.

Parameters	Males			Females		
	N	Mean	Standard variation	N	Mean	Standard variation
Age (yrs.)	9	28.22	2.05	31	26.74	2.97
Weight (kg)	9	75.67	9.70	31	64.65	12.11
Height (cm)	9	1.75	0.07	31	1.64	0.06
BMI (kg/m^2)	9	24.59	2.23	31	23.99	4.07
Waist circumference(cm)	9	82.67	8.03	31	76.71	13.51
Hip circumference (cm)	9	99.22	0.83	31	96.94	14.65
WHR	9	0.83	0.04	31	0.79	0.06

BMI = Body Mass Index; WHR = Waist Hip Ratio

Table 3: Glycemic index and glycemic load of the test meal

Test meals	Glycemic Index (GI)	Glycemic Load (GL)
Akpu white with Okra soup	56	11
Akpu pro-vitamin A with Okra soup	65	15
White garri with Okra soup	30	6
Yellow garri with Okra soup	3	1
Pro-vitamin A garri with Okra soup	3	1

CONCLUSION AND RECOMMENDATION

The study revealed that yellow garri with okra soup and pro-vitamin A garri with okra soup had lower glycemic index and load. This is recommended for persons living with diabetes.

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PE19

Lifestyle Practices, Glycaemic Control and Body Mass Index of Out-Patient Adult Diabetics Receiving Treatment in Selected Tertiary Hospitals in Enugu State

[*1]Maduforo A.N., [1]Ngwu E.K., [1]Ezeh E.C., [1]Aloysius-Maduforo M.C., [2]Ndiokwelu C.I., [1]Okoro C.E., [3]Okwara C.C., [4]Nwankwo R.N.

[1]Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Nigeria

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

[1]Department of Nutrition and Dietetics, University of Nigeria Teaching Hospital Ituku/Ozalla, Enugu, Nigeria

[4]Department of Nutrition and Dietetics, Federal Polytechnic, Mubi, Adamawa State, Nigeria.

aloysius.maduforo@unn.edu.ng

KEYWORDS:

BACKGROUND AND OBJECTIVE:

Limited information exist on the role of socio-demographic and lifestyle characteristics in the incidence of type 2 diabetes in Nigeria. The onset of type 2 diabetes mellitus is on the increase globally [1]. Managing diabetes mellitus is becoming more challenging due to several attributed factors [2]. This study assessed the socio-demographic and lifestyle characteristics of diabetes mellitus patients in selected tertiary hospitals Enugu state, South-east Nigeria.

METHODS:

The study adopted a cross-sectional design. All adult diabetic patients (18 -70) years old seeking services of dietitian-nutritionist in the out-patient department in two Teaching Hospitals in Enugu and one Faith-Based Specialist Hospital in Enugu from May to July, 2019 were recruited for the study. A structured validated questionnaire was used to obtain information on the socio-demographic, lifestyle habits, dietary diversity, method of diabetes mellitus management and the effectiveness of treatment. Glycaemic control was categorized with American Diabetes Association [3] cutoff for glycaemic recommendations for Non-pregnant adults with diabetes (fasting plasma glucose of maintained at 70–130 mg/dL [3.9–7.2 mmol/L]). Chi-square and Pearson's correlation were used to determine the association and relationship between demographic and health data of the respondents.

RESULTS:

A total of 81 respondents completed the study. Female predominance has been reported in various studies and this is true with the present study where 56.8% of the respondents were females. Higher educational qualifications has been linked with better health seeking behavior as well as less hospital admission. This is in agreement with the findings of this study as more (43.2%) of the respondents had a tertiary education while 67.9% resided in an urban area [4]. Smoking status and alcohol consumption is a male predominant lifestyle and hence, both were found to be significantly associated with sex in the present study ($p = 0.000$ and 0.001 respectively). Similar to other studies is the significant association between increased physical activity, average monthly income and previous consultation with a Registered Dietitian-Nutritionist ($p > 0.05$) with fasting blood glucose level control. Area in which the respondent resides, family history of diabetes and method of diabetes management were not significantly associated with the fasting blood sugar control of the respondents ($p > 0.05$). Overweight and obesity was high among the diabetic patients which could be a reason for the high rate (76.5%) of poor glycaemic control. Obesity precipitates insulin resistance and it is a risk factor for diabetes mellitus

[5]. Figure 1 shows the various variables of diabetes, glycaemic control, anthropometry and dietary diversity of the respondents.

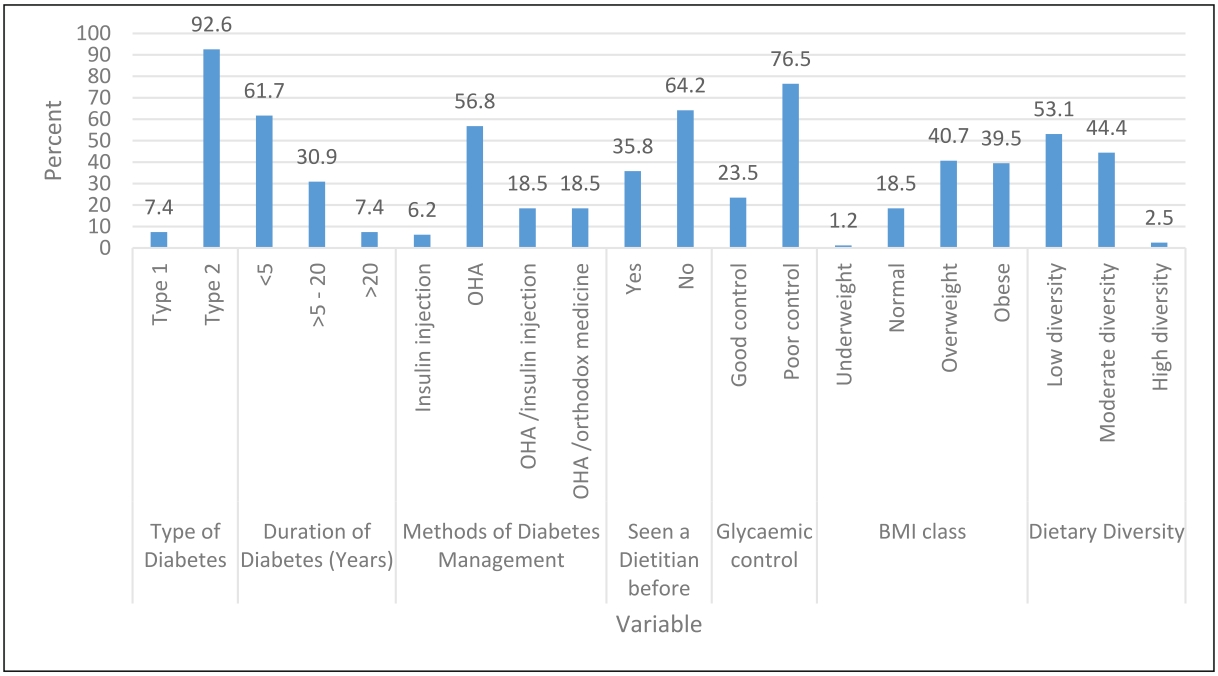

Figure 1: The variables of diabetes, glycaemic control, anthropometry and dietary diversity of the respondents.

Legend: BMI= Body Mass Index; OHA = Oral hypoglycaemic agents

CONCLUSION: In this study, good glycemic control is unlikely to be achieved through the use of insulin or oral therapy alone. Exercise, increased earnings and consultation with a registered Dietitian-Nutritionist is key to a better blood glucose level control.

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PE20

Breakfast Practice and Nutritional Status of Selected workers in Owerri Municipal council, Imo state.

Olubiyi , E.O & Onwueyiagba, C.
Alvan Ikoku Federal College of Education. Owerri, Imo State
odunolatreasure@gmail.com.

KEYWORDS: Breakfast, Workers, Nutritional Status, Anthropometric

BACKGROUND

Breakfast is the first meal of the day. It improves energy and mental power of concentration and participation in physical activities [1]. It has been identified to have effect on weight control, cardio-metabolic factors and cognitive performance [2]. As it is the first meal of the day that provides an excellent opportunity to fill the body with essential nutrients and fuel for the day, it can affect the nutritional status of an individual.

Nutritional status is the state of a person's health in terms of the nutrient in human diet [3]. Nutritional status is the balance between the intake of nutrients by an organism and the expenditure in the process of the growth, reproduction and health [4]. Nutritional status can be accessed through different methods as: anthropometric, biochemical, clinical and dietary methods. It is necessary to study breakfast practices and nutritional status of people especially the workers. Civil service, private and bank workers were selected as the respondents. This is necessary due to the importance of breakfast in the nutritional status of an individual.

The main purpose of the work is to find out breakfast practice and the nutritional status of selected workers in Owerri Municipal Council, Imo state. Specifically, the work tried to: (i) find out the knowledge of workers on importance of breakfast,(ii) determine when breakfast is taken by workers,(iii) find out the nutritional status of workers and (iv) to find out the correlation between breakfast practice and the nutritional status of workers in Owerri municipal council.

MATERIALS AND METHODOLOGY:

Structured questionnaire was used to obtain information on the knowledge and practice of the workers on breakfast consumption while anthropometric assessment of their weight and height was carried out and used to calculate their Body Mass Index (BMI) which was used to determine the nutritional status of the respondents. Data was analyzed using Means and frequencies and percentages.

RESULTS AND DISCUSSION:

The result revealed that 96.7% of the respondents had good knowledge on breakfast consumption while only 3.3% do not have knowledge. Fifty eight percentage (58%) of the respondents take their breakfast early between 7.00 and 8.00 am while only 3% eat as late as 11am and 12pm. Forty percent (40 %) of the workers are normal and 10% are underweight.

Tables 1: Time of taking of breakfast by workers in Owerri municipal, Imo state.

Breakfast time	frequency	percentage(%)
7-8 am	87	58
8-9 am	33	22
9-10 am	16	11
10-11am	10	6
11am-12pm	4	3
Total	150	100

Table 2 : Nutritional status of workers in Owerri municipal, Imo State

Nutritional status	cumulative mean	percentage%
Normal	19.5	40
Underweight	13.7	10
Overweight	27.3	28
Obese	37.6	22

CONCLUSION AND RECOMMENDATION:

Selected workers under study, (civil service, private and bank workers), had good breakfast knowledge and practice. Majority of them were well nourished, probably due to their knowledge on breakfast. Other workers could be studied

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OE21

Effects of Boiling and Toasting on the Proximate, Mineral, Anti-Nutrient and Fatty Acid Composition of Groundnut and Melon Seeds

Bassey Stella[1], Aburime, Lilian Chinelo[2] and Chiemela, Enyinnaya Chinma[3]

[1,2] *Department of Human Nutrition and Dietetics, Faculty of Basic Medical Sciences, University of Calabar.*

[3]*Department of Food Science and Technology, Federal University of Technology Minna,Nigeria: Minna,Nigeriaaburimelilian@gmail.com*

KEYWORDS: Breakfast, Workers, Nutritional Status, Anthropometric

BACKGROUND:

The effect of boiling, toasting and dehulling on the proximate, mineral, anti-nutrient and fatty acid composition of groundnut and melon seeds were determined.

MATERIALS AND METHODS:

Raw melon (hand peeled) were purchased from Watts market, while raw groundnut with shell were obtained from the farm in Cross River State, Nigeria in the month of October. Raw shelled groundnut seed was picked to remove stones and dirt, then boiled for 10minutes. After boiling, it was deshelled, sundried for 72hrs and milled for chemical analysis. Raw melon seeds (hand peeled) were washed and blended using an electric blender for 2mins with medium speed. After blending, it was boiled for 25 minutes, then sundried for 48hours. Standard laboratory methods were used for proximate Mineral, anti-nutrient and fatty acid analysis.

RESULT AND DISCUSSION:

Boiling led to significant ($P<0.05$) decreases in protein, fat, dietary fibre and sodium contents of both the groundnut and melon seeds. While, reverse was the case for potassium, magnesium and iron. Toasting significantly ($P<0.05$) increased protein from 7.4% to 10.6% while carbohydrate, calcium, phosphorus, potassium, magnesium and iron contents had decreases that ranged from 13% to 63.9%. There was no significant ($P<0.05$) change in the dietary fibre, fat and sodium contents of toasted groundnut seeds. Palmitic, lauric, behenic, oleic, linoleic and linolenic fatty acids contents of toasted groundnut seeds were significantly ($P<0.05$) reduced. Phytates, hemagglutinins and trypsin inhibitors of the boiled and roasted seeds were significantly reduced ($P<0.05$). The contributions of these seeds to the recommended Nutrient Intake (RNI) of adults ranged from 0.4% in sodium to 87 % in dietary fibre.

CONCLUSION AND RECOMMENDATION:

With the generated data from this study, consumer can leverage on the comparative nutrient advantages for an informed food choices and cooking methods.

OE22

Consumption Pattern and Standardization of some Food recipes from Lima Bean in Kaduna State, Northwestern Nigeria

Dankat Charity Baliyat[1] **, , Owolabi Olumuyiwa Adeyemi**[1 2] **and Okolo Ijeoma**[1 3]
[1]*Department of Biochemistry, Ahmadu Bello University, Zaria-Kaduna State, Nigeria*
cdankat@gmail.com

KEYWORDS: Standardization, Lima bean, Foods, Consumption pattern, Sensory attributes

BACKGROUND:
Dietary diversification is a food-based approach aimed at promoting nutrition outcomes. This study was conducted to provide a nutritional basis for increased utilization of Lima beans (*Phaseolus lunatus*) as a value-added product in households.

OBJECTIVE:
The study aimed to determine the consumption pattern of commonly consumed Lima beans foods and standardize the recipes.

MATERIAL AND METHODS:
Four hundred households were randomly selected from three Local Government Areas, spread within the three senatorial zones of Kaduna State using probability proportional to size. The commonly consumed Lima beans foods and consumption pattern were determined using a validated semi structured questionnaire. The identified foods were standardized using standard the methods described by Ogunlana et al, 1999, and then subjected to sensory analysis on a 5-point hedonic scale using standard procedures of modern et al, 2007
Results: Data revealed that only 54% of the population consumed Lima beans foods, less than one seventh (13%) of the respondents consumed Lima beans at least once to twice a week with 10% consuming only once or occasionally per year. The most consumed Lima beans foods in the state is Lima bean porridge (35%), followed by Lima bean-benniseed (8%) and Lima bean-hungry rice (6%). These commonly consumed foods were standardized and their sensory attributes of colour, texture, taste and aroma ranked Lima bean - hungry rice as the most preferred (4.60) followed by Lima bean – porridge (4.20) and Lima bean-benniseed (3.50) on a 5-point hedonic scale.
Conclusion and recommendation: The three commonly consumed Lima beans recipes were considered acceptable. I howeverhere is need for an increase extension work in the utilization of Lima bean foods to help in alleviating the effects of malnutrition.

OE23

Knowledge, Preventive and Dietary Practices Against Cervical Cancer among Female Undergraduates in Tertiary Institutions in South West, Nigeria.

Lano-MaduaguA.T*[1], Quadri J.A[2] & Maduagu C.O[3]

[1,3]*University of Lagos, Faculty of Education, Lagos, Nigeria.*

[2]*Olabisi Onabanjo University, Ago-iwoye, Ogun state*

KEYWORDS: Cervical Cancer, Knowledge, Preventive, Dietary Practices

BACKGROUND AND OBJECTIVES:

Cervical cancer is a leading cause of morbidity and mortality in women especially in sub-Saharan African countries. Globally, it is the second commonest cancer in women with 529,828 new cases being diagnosed every year; 85% of which are in developing countries. This study was to assess the Knowledge, preventive and dietary practices against cervical cancer among female undergraduates.

MATERIALS AND METHOD:

This was a descriptive cross sectional study and a multistage sampling method was adopted in selecting the sample. A total of 181 questionnaires were administered and data were analysed using EPI-INFO statistical software version 7.1.

RESULTS AND DISCUSSION:

The results shows 39.2% of the respondents were within 21-25 years of age and majority (78.5%) were not married. Less than half of the respondents (43.6%) had good knowledge on cervical cancer. Majority of the respondents were not aware of the foods/diet to consume in order to prevent cervical cancer. There was no significant association between knowledge of the respondents on cervical cancer, and also no significant association between knowledge of the diet that prevents cervical cancer and their socio-demographic variables (p-value >0.05). According to the study, many of the respondents does not have good knowledge on cervical cancer and the diet that can prevent it, this result is dissimilar to a study in south-south Nigeria in which a total of 250 students were surveyed comprising of pharmacy, nursing, medical lab and medical students in which majority of respondents had a good knowledge of Cervical Cancer. The higher level of knowledge seen in the latter study can be attributed to the facts that the respondents were medically inclined as opposed to the respondents in this current who were students from other discipline.

CONCLUSION AND RECOMMENDATION(S):

Though, the study has shown that most of the respondents were aware of cervical cancer but less than half of the respondents have good knowledge of how it can be prevented. It is recommended among others that female undergraduate students as well as other women should be enlightened about cervical cancer and the foods/diet to take in order to increase their knowledge and prevent cervical cancer.

OE24

Household Food Security, Dietary Pattern and Nutritional Status of Young Children in a Nigerian Community: Observations During the COVID-19 Pandemic

Olodu, M.D[1*]., Fagbulu, O.J[2]., Teniola A.O[2]., Afolabi B.K[3]., Adeomi A.A[1].

[1]Department of Community Health, Faculty of Clinical Sciences, College of Health Sciences, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.*

[2]Community Health Officer's Training Programme, Obafemi Awolowo University Teaching Hospitals Complex,Ile-Ife,Nigeria.

[3] Urban Comprehensive Health Centre (UCHC), Eleyele Ile-Ife, Nigeriamondayolodu@gmail.com

KEYWORDS: Household Food security, Dietary Pattern, Nutritional Status, COVID-19

BACKGROUND AND OBJECTİVES:

The emergence of the novel Coronavirus in late 2019 lead to disruption in the food, economic and health system [1]. Since the onset, the death tolls globally is alarmingly high, claiming 4,200,412 lives as of 30th July 2021 [2]. There are projections that the pandemic will worsen hunger and malnutrition in families with young children and women of reproductive age [3, 4]. This study investigated household food security status, dietary pattern and nutritional status of children (6-59 mo.) in a Nigerian community 12 months after the outbreak of the COVID-19 pandemic.

MATERIALS AND METHOD:

Study Design: It was a community-based descriptive cross-sectional study. The study took place at Emure Local Government Area (LGA), Ekiti State.

Study Participants & Instruments: A total sample of 200 mother-child dyads was selected from Emure LGA using a multi-stage sampling technique. A semi-structured interviewer-administered questionnaire, which had four sections, was used to elicit information. Six-Item Food Security Scale was used to assess household food security. Dietary patterns and diversity were assessed using a food frequency questionnaire and 24-hour recall, respectively.

Nutritional status was determined using anthropometric parameters. Univariate analysis was done to describe the data.

RESULTS AND DISCUSSION:

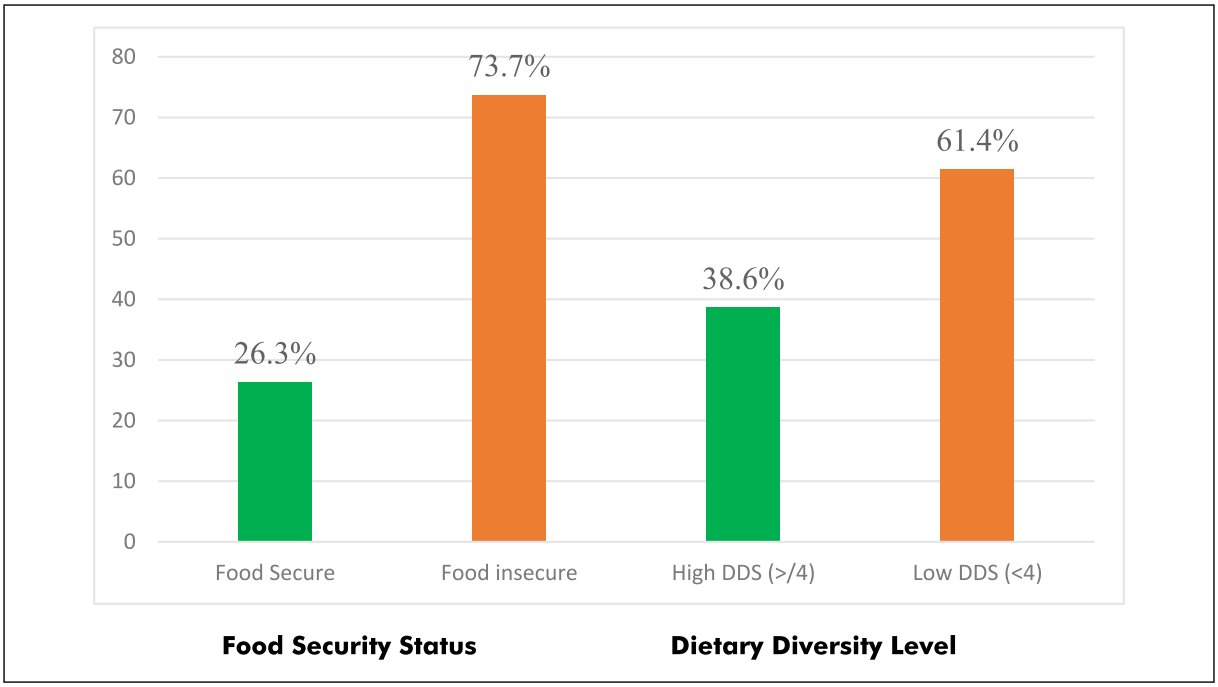

Fig 1: Food Security Status and Dietary Diversity of Participants

- The prevalence of food insecurity in households with mothers and children 6-59 months was high.
- Most consumed food everyday were cereals, Root & tubers (79.5%) and Sugar and Junk (61.4%), while the least consumed were dairy (15.8%), vegetables (18.1%) and fruit (19.3%).
- More than half of the children had low dietary diversity.

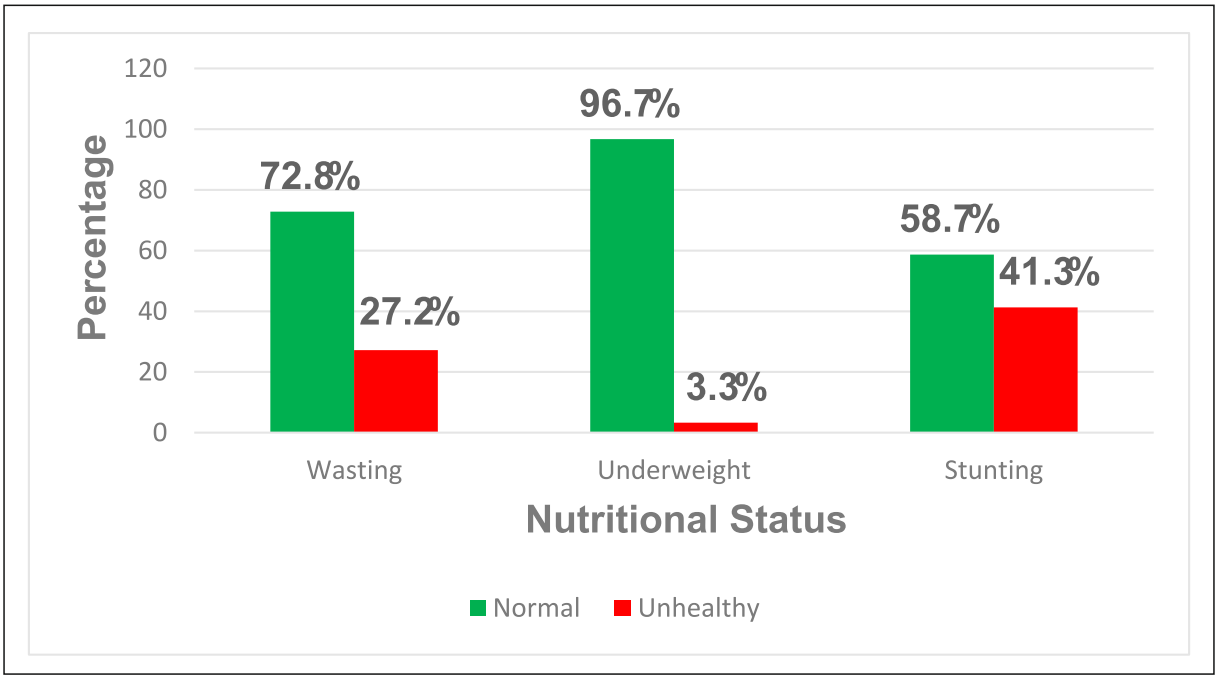

Fig 2: Current Nutritional Status of Children

•The prevalence of stunting, wasting and underweight is 41.3%, 27.2% and 3.3%, respectively

CONCLUSION AND RECOMMENDATİON(S):

- The consequences of poor diet quality are becoming evident as wasting and stunting are high
- An urgent public health intervention is needed to improve food security in vulnerable households.

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OE25

Investigate on the Relationship Between Maternal hematological Parameters and Micronutrient Status with Birth Outcome Among Pregnant Women in Kaduna State.

Safiya A.T., *Maimuna L.A., **Usman Bello.

**Department of Nutrition and Dietetics, Kaduna Polytechnic, Kaduna Nigeria.*

***Biochemistry Department, Umaru Musa Yar'Adua, Katsina State University, Katsina State.*

safiyaaliyutijjani@gmail.com

KEYWORDS: Birth Outcome, Maternal, Hematological, Serum, Cholesterol.

BACKGROUND AND OBJECTIVES

A nutritionally adequate dietary pattern is important throughout the trimesters to ensure a healthy pregnancy and baby (1). Pregnant women in developing country have been reported to consume diets deficient in both macro and micronutrients (2). The aim of the research is to Investigate on the Relationship Between Maternal Hematological Parameters and Micronutrient Status with Birth Outcome Among Pregnant Women in Kaduna State. Specifically: Determine the level of some hematological parameters, Determine lipid profile and some important serum minerals among pregnant women in their third trimester of pregnancy

MATERIALS AND METHODS

A longitudinal study was conducted following Sixty-Seven (67) pregnant women and their newborn babies. A validated semi structured questionnaire was administered to pregnant women to elicit information on their socio-demographic characteristic. Maternal blood sample was collected in the hospital laboratory, biochemical analysis for determination of hematological parameters (cholesterol, triglyceride) serum mineral (iron, zinc and copper) was also conducted. Neonatal nutritional status was assessed and compared with (3) Z-score standard using Anthro Software version 14. SPSS version 20.0 was used to collate and analyze the data. Results are presented in Mean ± standard deviation except if stated otherwise. Result with $p<0.05$ or $p<0.001$ considered significant were applicable.

RESULTS AND DISCUSSION

Table 4.9 shows that the mean values of total cholesterol, LDL-cholesterol, Triglycerol are within normal range except HDL-cholesterol which are slightly above the reference. Distribution
of pregnant women LDL-cholesterol, shows that more than half (69.10%) of the pregnant women were normal and 30.90% has high LDL-cholesterol level when compared to the normal pregnancy reference range. Distribution of pregnant women serum triglyceride level indicates that 44.10% of the pregnant women are normal and 32.40% belong to low category while 23.50% had hypertriglyceridemia.

Table 1: Distribution of Maternal Serum Lipid Profile According to Age Range

Age (years)	Freq.	%	Total Cholesterol (mmol/l) Mean±SD	HDL-Cholesterol (mmol/l) Mean±SD	LDL-Cholesterol (mmol/l) Mean±SD	Triglycerides (mmol/l) Mean±SD
15 – 19	7	10.4	6.92 ± 1.90^{a}	3.08 ± 2.10^{a}	5.08 ± 1.20^{a}	3.35 ± 1.21^{a}
20 – 24	10	14.9	6.47 ± 1.41^{b}	1.66 ± 0.71^{b}	4.37 ± 1.30^{b}	4.38 ± 1.40^{b}
25 – 29	12	17.9	6.60 ± 1.91^{a}	2.69 ± 1.72^{a}	5.23 ± 1.51^{a}	3.66 ± 1.12^{b}
30 – 34	11	16.9	7.03 ± 1.92^{a}	3.54 ± 1.91^{c}	5.35 ± 1.21^{a}	3.55 ± 1.12^{b}
35 – 39	12	17.9	6.80 ± 2.20^{a}	1.98 ± 0.91^{b}	5.05 ± 1.91^{a}	3.77 ± 1.11^{b}
40 – 44	12	17.9	6.88 ± 1.41^{a}	3.31 ± 1.70^{a}	5.31 ± 1.12^{a}	3.41 ± 1.21^{a}
45 – 49	3	4.5	8.59 ± 1.41^{c}	3.61 ± 1.12^{c}	5.78 ± 0.90^{c}	3.61 ± 0.10
	67	100.0	6.86 ± 1.79	2.74 ± 1.66^{a}	5.11 ± 1.40^{a}	3.69 ± 1.17^{b}
Reference Ranges**			5.67–9.04	1.24– 2.25	2.62–5.80	3.39 – 5.1

Values are Mean ±SD, (n=67), Means in the same column with different superscript are considered significantly different ($p<0.05$). T-chl -total
cholesterol, HDL- high density lipoprotein, LDL- low density lipoprotein, TG- triglycerides. (**Abbassi-Ghanavati *et al*., 2009).

CONCLUSION AND RECOMMENDATION

Hematological parameters shows strong association with neonatal birth weights. A routine test for total cholesterol during pregnancy should be conducted, in order to differentiate between a physiological increase and a pathological one. Hence the need to establish a national reference range for Nigerian population.

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PE26

Eating habits and perceptions of undergraduates about healthy eating before and during the COVID-19 lockdown in Nigeria

Olawuyi Y.O., Hassan F.I. and Olutunde B.
Nutrition and Dietetics Programme, Bowen University, Iwo, Osun State.
yetundeoluolawuyi@gmail.com

KEYWORDS: Eating habits, Nutritional requirement, COVID-19, Undergraduate

BACKGROUND AND OBJECTIVES:
Nutrition knowledge is an important factor that influences healthy food habits which ensure that nutrient needs throughout lifecycle are met (1). Many young students eat a lot of industrially processed food, lack of nutrition or inadequate dietary consumption impacts the health of students and the academic performance of undergraduate students. However, the Covid-19 lockdown afforded students the opportunity to stay home and probably have less access to processed foods and more time to listen to nutrition information. Undergraduate's studies have shown that young adults knowledge and adherence of the national dietary guidelines are at a very low rate (2). It is of significance to recognize why teenagers are making bad meals and beverage alternatives a part of their daily consumptions so as for this populace to keep away from weight gain. It is also important that undergraduate students should develop and sustain healthy eating and lifestyle habits during their university years as these habits are likely to be sustained and have a vital influence on their health in future (3).
This study therefore, assessed the eating habit and perception of undergraduates towards healthy eating before and during the COVID-19 pandemic.

MATERIALS AND METHOD:
A descriptive cross-sectional survey design was adopted for this study. Random sampling method was used to obtain information from 400 undergraduate respondents online. A structured questionnaire was used to elicit information on the respondents' nutrition knowledge, attitude and eating habits before and during the COVID-19. Data collected was subjected to descriptive statistics using the SPSS version 20.0

RESULTS AND DISCUSSION:
Majority (84%) of the respondents claimed that the COVID-19 holiday affected their dietary habit. 41.9% ate less, 41 (10.2%) respondents ate more while 34% now have a better knowledge about nutrition during COVID-19. In comparing the frequency of consumption of foods before and during COVID-19, many of the respondents (43.2%) reported an increase in the consumption of fruits and vegetables; consumption of legumes, nuts and seeds, snacks, juices and dairy foods also increased while meats, spices and condiments, starchy foods and fats remained the same in both periods.

CONCLUSION AND RECOMMENDATİON(S):
The eating habits and perceptions of undergraduates during the COVID-19 lockdown seemed to be better than before the lockdown. Although some participants demonstrated healthy dietary patterns and sufficient knowledge of nutrition, there is a need to further explore the students' understanding of healthy eating.

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OE28

Nutritive value, zinc bioavailability and glycemic index of "chin-chin," bread and biscuit made from composite flours made from African yam beam, orange-fleshed sweet potato, plantain, maize, and wheat

***Aburime, L.C[1], Ene-Obong, H.N[2] and David-Oku, E[3].**
**1-2. Department of Human Nutrition and Dietetic, Faculty of Basic Medical Sciences University of Calabar, Calabar- Nigeria*
aburimelilian@gmail.com

KEYWORDS: Eating habits, Nutritional requirement, COVID-19, Undergraduate

BACKGROUND AND OBJECTİVES:
The combination of legumes and cereals/tubers in a single meal or snack can help promote better nutrition and reduce the development of some chronic Non-Communicable Diseases (NCD), especially diabetes. The objective of this work was to determine the nutritive value, zinc bioavailability, and glycemic index of "chin-chin" bread and biscuit made from composite flours from African yam bean (AYB), orange fleshed sweet potatoes (OFSP), maize, plantain and wheat.

MATERIALS AND METHOD:
OFSP (*Ipomea batata)*, AYB (*Sphenostylis stenocarpa)*, maize (*Zea mays*), plantain (*Musa paradisca*) and wheat (*Triticum aestivum*) flour were purchased from Nigerian markets. AYB seeds were sorted, washed, and fermented in citric acid medium (0.5%) for 24hrs at room temperature (28°C) in a seed water ratio of 1:4 (w/v). At the end of the fermentation, the seeds were dehulled. Maize seeds were sorted and fermented for 48hrs at room temperature (28°C) in a seed water ratio of 1:3 (w/v). The fermented grains were separately dried and milled into flour for further use. Green matured plantain fruits were separately washed to remove adhering soil particles, peeled, and sliced into a thin thickness of about 2 cm and then dried in a food dehydrator (40- 50°C) for 24hr and milled into fine flour. Biscuits, 'chin-chin' and bread were developed from AYB and plantain composite flours (70:30) AYB and OFSP composite flours (50:50) and wheat and maize composite flours (70:30) using standard methods. Standard laboratory methods were used for proximate and mineral analysis. Using 50g anhydrous glucose as the reference food and 50g available carbohydrate for the test food, the Glycemic Index (GI) of each food was determined by feeding them to 12 healthy subjects after an overnight fast. The incremental Area Under Curve (AUC) was used for the

calculation of the GI of foods. The analysis of variance (ANOVA) was used to analyze the data. Significant difference was accepted at $P<0.05$

RESULT AND DISCUSSION:

The ranges of the proximate composition of the bread, 'chin-chin' and biscuit were as follows;moisture 6.2-37.6%, protein 9.6-13.6%, ash 2-2.1%, fat 2.6-7.6%, dietary fibre 4.9-9.9%, 0.06-0.12%, available carbohydrate 43.1- 60.7%. The ranges of the mineral compositions are as follows: iron 0.96 – 7.37mg/100g, zinc 1.41-1.96mg/100g, magnesium 3-57mg/100g, calcium 20-160mg/100g, potassium 90-323mg/100g, sodium 58-282mg/100g, phosphorus 139-204mg/100g, α-carotenoid 612 -1042 mcg/100g, β-Carotene 646- 1146 mcg/100g, vitamin A (RAE) 69- 129mcg/100g.The phytate- zinc molar ratio of the products was low (0.00). The contributions of the 100g of the products to the Recommended Nutrient Intake (RNI) of adults ranged as follows: iron 7-99%, zinc 10-65%, calcium 4-23%, phosphorus 38-51%, sodium 5-13%, potassium 4-18%, magnesium 1-382%, vitamin A 11-18%, protein 21-30%, dietary fibre 13-39%, fat 4-12, available carbohydrate 33-52%. The Glycemic index (GI) of the products ranged from 15-63.

CONCLUSION AND RECOMMENDATION:

Availability and consumption of low GI foods made from indigenous raw food materials will enhance healthy diets and this might lower the number of health problems arising from poor dietary practices that leads to chronic non-communicable diseases. Diabetic patients and healthy individuals are recommended to leverage on this findings in choosing their diets.

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PE29

Dietary Patterns and Sociodemographic Characteristics of Community-Dwelling Adults In Nigeria

Ukegbu, P.O.,[1] Ortutu B. F.,[1] Nwamadi P. C.,[1] Ojwang, A.[2]

[1] *Michael Okpara University of Agriculture, Umudike, Abia State, PMB 7267, Umuahia, Nigeria.*

[2]*Department of Human Nutrition and Dietetics, The Technical University of Kenya*

adanna2025@yahoo.com

KEYWORDS: Dietary Patterns, Principal Component Analysis, Sociodemographic Factors, Adults.

BACKGROUND:
Identifying dietary patterns as a means of preventing diet-related chronic diseases among populations in low- and middle-income countries undergoing nutrition transition is important (1, 2). Information regarding the dietary patterns and sociodemographic characteristics as it influences the incidence of non-communicable diseases are scarce. Therefore, dietary pattern analysis using empirically derived data are useful for this purpose

MATERIALS AND METHODS:
A community-based cross-sectional study was carried out among 868 adults aged 20 to 59 years in urban and rural areas of Abia State, Nigeria. A questionnaire was used to obtain socio-demographic information. Dietary patterns were identified by Principal Component Analysis (PCA) based on the consumption of 10 food groups, assessed using a 7-day qualitative food frequency questionnaire. Bivariate and multivariate logistic regression analyses were used to evaluate the association between identified patterns and associated factors.

RESULT AND DISCUSSION:
Two main dietary patterns were identified; a traditional pattern characterized by high factor loading of starchy staples, vegetable soups/sauces, animal proteins, legumes and a mix of processed cereals and grains; and a convenience pattern with high factor loading for processed cereals, soft drinks and alcoholic beverages. High adherence to the traditional pattern was lower among larger households (>3) [AOR =0.633; 95% CI (0.429-0.934); p = 0.021]. On the other hand, high adherence to the convenience pattern was more common among females [AOR =1.586; 95% CI (1.104-2.279); p = 0.013] and older adults (AOR = 1.750; 95% CI (1.075-2.848); p = 0.024], but least common among rural participants [AOR =0.316 1.586; 95% CI (0.219-0.456); p = 0.000].

Table 5: Multivariate logistic regression exploring socio-demographic factors associated with high consumption of traditional and convenience patterns

Factors	Dietary patterns			
	Traditional AOR (95% CI)	P value	Convenience AOR (95% CI)	P value
Sex				
Male	Ref		Ref	
Female	1.185 (0.844-1.663)	0.326	1.586 (1.104-2.279)	0.013*
Age (years)				
Young adults (≤40)	Ref		Ref	
Middle-aged adults (>40)	1.085 (0.719-1.637)	0.699	1.750 (1.075-2.848)	0.024*
Place of residence				
Urban	Ref		Ref	
Rural	1.286 (0.917-1.804)	0.146	0.316 (0.219-0.456)	0.001*
Marital status				
Single	Ref		Ref	
Married	0.720 (0.481-1.077)	0.110	1.078 (0.716-1.622)	0.719
Education				
No formal education	Ref		Ref	
Educated	0.846 (0.513-1.396)	0.513	0.606 (0.319-1.150)	0.319
Income				
<#30,000	Ref		Ref	
#30,000 to 100,000	1.541 (0.601-3.953)	0.368	1.345 (0.509- 3.551)	0.550
>#100,000	1.243 (0.484-3.198)	0.651	1.076 (0.405-2.860)	0.883
Occupation				
Employed	Ref		Ref	
Unemployed	0.861 (0.567-1.308)	0.482	1.007 (0.658-1.543)	0.974
Household size				
≤ 3	Ref		Ref	
>3	0.633 (0.429-0.934)	0.021*	1.046 (0.727-1.506)	0.809

*Factors are statistically significant

CONCLUSION AND RECOMMENDATION(S):
The two dietary patterns; traditional and convenience were associated with socio-demographic variables (age, gender, household size and place of residence). This study provides valuable information for the development and maintenance of healthier dietary behavior among adults. Nutrition education efforts should be emphasized to improve dietary pattern among adults in Nigeria. Longitudinal studies are needed to evaluate whether dietary pattern is influenced by sociodemographic characteristics.

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PE30

Haematological Assessment of Albino Rats Fed Formulated Diets From Fermented and Malted Millet, African Yam Bean and Breadfruit

Anyanwu[1], GC, Uwaegbute[2], AC, Asumugha[2], VU., Ezeibe[2], CP

[1]*Nutrition Division, Family Health Department, Federal Ministry of Health, Federal Secretariat Complex Phase III, Abuja, Nigeria*

[2]*Michael Okpara University of Agriculture, Umudike, Abia State*

ganyanwu73@yahoo.com

KEYWORDS: Haematological-Asssesment, Fermented, Malted, Formulated-Diets

BACKGROUND:
Blood parameters are important in assessing the quality and suitability of feed ingredients in farm animals (1). Examination of blood provides the opportunity to clinically investigate the physiological, nutritional and pathological status of an animal (2, 3). Haematological components, which consist of red blood cells, white blood cells or leucocytes, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration are valuable in monitoring feed toxicity especially with feed constituents that affect the blood as well as the health status of farm animals (4). This study therefore, assessed the haematological parameters of albino rats fed formulated diets from fermented and malted millet, African yam bean and breadfruit.

MATERIALS AND METHOD:
An experimental study design was used. Six different diets were formulated using the fermented and malted millet, African yam bean and breadfruit and these were used to feed six groups of the albino rats respectively. The seventh group of the albino rats were fed Cerelac which served as the control. Blood samples were collected and used to assess the heamatological parameters. Data obtained were

analysed using SPSS version 20. SEM of triplicate determinations and ANOVA was done. Means were separated by Duncan's Multiple Range Test and significance judged at ($P<0.05$)

RESULT:

The serum glucose of the rats fed diet 1 was the highest (126.44mg/dL). Rats fed diet 5, 6 and the control group had the highest triglyceride values (43.67, 48.33 and 46.67) respectively. There were no significant differences ($P> 0.05$) in the cholesterol, albumin and creatinine levels. The group fed diet 6 had the highest HDL (32.67 mg/dL). The PCV of rats fed cerelac, diet 5, 6, 1 and 4 had the highest ($P> 0.05$) values. A higher HDL value as found in the group of rats fed diet 6 and cerelac is an indicative of diet with better cholesterol level. It also shows that these group of rats fed these diets are in a better position of not suffering from any cholesterol related disease because of the presence of higher HDL in their blood. There were significant differences ($P<0.05$) in the serum urea, RBC, WBC, ASP, ALT and bilibirum levels. The Hb level of the control group had the highest value (13.11 g/100ml). The higher Hb value of the group of rats fed the control diet (cerelac) is quite understanding. This could be as a result of the fortification of the product with iron. The group fed diets 5, 8, 4, 1 and 6 had comparable Hb levels respectively.

CONCLUSION:

The result from the cholesterol levels and other haematological parameters assessed in the group of rats fed diet 6 ,5 4 and 1 showed that they had better values in comparism with cerelac the control diet and did not show any adverse effect on the liver and kidney functions.

RECOMMENDATION:

Based on the result, it is recommended that the combination of formulated diets from breadfruit, African yam beans and millet as seen in diets 6,5,4 and 1 is safe and could be useful in producing infant formula.

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OE31

Haematinic Potentials Of *Emilia Sonchifolia* Leaves On Anaemia Induced Adult Male Wistar Rats.

Afiaenyi, I. C[1]., Oguadinma, K. R[2]
kasieoguadinma@gmail.com

KEYWORDS: Anaemia, *Emilia Sonchifolia*, Haematological Parameters

BACKGROUND AND OBJECTIVES:
Anaemia has become the order of the day in many societies especially in the developing countries. Anaemia has been defined as a low blood haemoglobin concentration and has been shown to be a public health problem that affects low-, middle- and high-income countries. It has significant adverse health consequences, as well as adverse impacts on social and economic development. Previous studies have shown that *Emilia sonchifolia* has hepatoprotective, antinociceptive, antimicrobial, antioxidant and anti-inflammatory effects but little has been done on the its effect on the haematological parameters in animal models. This study, therefore, aimed at determining the haematinic potentials of *Emilia sonchifolia* on anaemia induced adult wistar male rats.

MATERIALS AND METHODS:
The study adopted an experimental design**.** The raw *Emilia sonchifolia* leaves were pureed and analyzed for nutrient content. Standard procedures were used to analyze the pureed leaves for iron, vitamin C and beta catotene. A total of twenty (24) rats weighing between 100 – 160g were used for the experiment. The animals were grouped into four groups of six animals each. Anaemia was induced by intraperitoneal administration of cyclophosphamide (30mg/kg body weight of the rats). The control group (group 1) received the rat chow and water only. Groups 2, 3 and 4 received 5 g, 10 g and 15 g of the raw pureed *Emilia sonchifolia* leaves per kg body weight in addition to rat chow and water. Blood collection from the animal was through the retro-orbital plexus. Blood samples were collected before induction of anaemia, after induction to ascertain the presence of anaemia, and fourteen (14) days after treatment and were subjected to haematological analysis. The haematological parameters (red blood cell (RBC), white blood cell (WBC), haemoglobin (HB), packed cell volume (PCV), neutrophils, lymphocytes, monocytes, eosinophils and basohils) were analysed using standard procedures.

RESULTS AND DISCUSSION:
The iron content of *Emiliia sonchifolia* observed in this leaf was significantly lower than the reports of Morshed et al. (2021) who reported 29.00mg/100g in their study but higher than 0.85mg/100g of iron reported by Goplan et al. (1999) on fresh *Moringa oleifera* leaves. These variations could be attributed to location, varieties and level of maturity of the vegetables when they were harvested. The results revealed a significant ($p < 0.05$) increase in the PCV, HB and RBC values of the group fed 5g/kg body weight of *Emilia sonchifolia* and no significant ($p < 0.05$) decrease or increase in the groups fed 10g and 15g/kg body weight. This agrees with the findings of Madukwe et al. (2013) who reported more improvement in the mean PCV levels of rats fed 5% *Moringa oleifera* leaf powder than those fed 10%. There was a significant ($p < 0.05$) decrease in the total white blood cell of all the groups after treatment. This is similar to the findings of Edet et al. (2011) who reported that rats treated with *Gongronema latifolium* (200 and 400 mg/kg body weight) had significant decrease in their WBC count compared with the control.**Conclusions and recommendations:** The leaves of *Emilia sonchifolia* have

Table 1: Packed cell volume (PCV) of the rats before induction, after induction and after treatment.

Group	Baseline (%)	After induction (%)	After treatment (%)
1	47.33 ± 6.74^{a}	31.00 ± 5.52^{b}	48.00 ± 4.38^{a}
2	48.17 ± 4.62^{a}	29.83 ± 2.32^{b}	61.33 ± 3.56^{c}
3	45.50 ± 2.74^{a}	27.67 ± 1.37^{bc}	52.17 ± 26.06^{ac}
4	49.50 ± 5.79^{a}	29.50 ± 1.87^{bc}	54.17 ± 26.86^{ac}

CONCLUSIONS AND RECOMMENDATIONS:

The leaves of *Emilia sonchifolia* have positive effects on the hematological parameters of adult male anaemic rats that were tested which included red blood cell, total white blood cells, packed cell volume, haemoglobin and the differential white blood cells (lymphocytes, basophils, monocytes, neutrophils and eosinophils). It could be deduced that the leaves of E*milia sonchifolia* has promising haematinic effects.

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OE32

Assessment of Vitamin D intake and Inflammatory Biomarker in Elderly Inpatients of State Hospital Ijaiye, Abeokuta.

Olayemi M.G and Olayiwola I.O

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

KEYWORDS: Vitamin D, Elderly, WBC, in patients

BACKGROUND

The term vitamin D refers to two molecules, ergocalciferol (D2) and cholecalciferol (D3). Cholecalciferol is the most effective form of vitamin D and is manufactured in the skin by the action of ultraviolet radiation on 7-dehydrocholesterol. Recent evidence suggests that low vitamin D concentrations are associated with increased levels of inflammatory markers (1). Vitamin D deficiency is especially likely in older adults for several reasons. For one, the skin, liver, and kidneys lose their capacity to make and activate vitamin D with

advancing age. Thus, this study assessed the vitamin D intake and inflammatory biomarker white blood cell count (WBC) of elderly inpatient in State Hospital Ijaiye, Abeokuta, Ogun State. The specific objective of the study is to: describe the socio-demographic character of the subjects, measure the vitamin D intake of the subjects, assess the nutritional status of the subjects and investigate the association between the vitamin D intake and the white blood test count.

MATERIALS AND METHOD

A socio-demographic pre-tested questionnaire was used to collect data on the socio-demographic characteristics of the subjects. Anthropometric measurements of all subjects were taken following standard procedure and body mass index (BMI) was derived to calculate the subject nutritional status. A validated Vitamin D intake (2) and 24-hour dietary recall questionnaires were used to collect data on Vitamin D intake of the subjects. Blood sample was taken to assess the white blood cell count.

RESULTS AND DISCUSSION

The subjects were 52.2% male and 47.8% female. The mean age of the subjects was 61.5 years, the minimum age was 55 years and the maximum age was 76 years. The mean intake using 24-hour dietary recall was 1.07ug±0.76, among the subjects 13% consume 0.00ug of vitamin D per day, 52.2% consume 0.8ug of vitamin D per day and 4.3% consume 1.2ug of vitamin D per day. The mean intake using short vitamin D questionnaire was 5.5ug±0.98. The minimum white blood cell recorded was $2.9*10^3$ uL of blood, the maximum was $24.1*10^3$uL of blood and the mean value was $8.7*10^3$±5.17. The majority (56.5%) of the subjects were of normal (BMI), 13% of the subjects were underweight,13% were overweight and 17.4% were obese. There was no significant correlation between vitamin D intake and the inflammatory biomarker (WBC) using 24-hour dietary recall (r=-.230). Also, there was no significant correlation between Vitamin D intake using short vitamin D questionnaire and white blood cell count (r=-.001). However, Pearson correlation showed a linear relationship between vitamin D intake using the 24-hour dietary and White Blood Cell Count.

CONCLUSION AND RECOMMENDATION

After assessing the nutritional status, vitamin D intake and the white blood cells, it was observed that nutritional status is normal for about half of the patient and about a quarter were malnourished either underweight or overweight. The mean intake of vitamin D was low but the white blood cell count was normal for the patient studied. A linear relationship was observed between vitamin D intake and White Blood cell count.

Elderly inpatients should be assessed of Vitamin D intake by Registered Dietitian Nutritionist once they are admitted. Team medical support to manage the serum Vitamin D of the inpatients and provide the proper interventions for low serum vitamin D. Elderly should be encouraged to take more food sources of Vitamin D rich food like egg, fish, milk and yoghurt.

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PE33

Iron Status And Nutritional Vulnerability of The Elderly (60 Years And Above) in Ijero Local Government Area in Ekiti-State

Onyemah Janet Adetunbi (RD)
janet.adetunbi.pg76697@unn.edu.ng

KEYWORDS:

BACKGROUND:
Malnutrition is a great problem in which the elderly appears to be more vulnerable, many have insufficient income and are poor, low derivational levels, few pension benefits, lack adequate housing and are poorly integrated socially. Iron plays a role as a part of other proteins within the body. The study assessed the iron status and Nutritional vulnerability of the elderly in Ijero local government Area in Ekiti-state. Three hundred and eighty elderly who gave their informed consent participated in the study. Structured questionnaire was used to elicit information on socio-economic and demographic characteristic of the elderly, food intake pattern, consumption of Iron rich food sources. Mini Nutritional Assessment (MNA) and Malnutrition Universal Screening Tools (MUST) were used for nutritional vulnerability status. Nutritional vulnerability was assessed using MNA scores. Data obtained from the study was coded into the computer and analysed using the Statistical Product and Service Solution (SPSS) for windows version 25.0. Results were presented as frequency and percentages, means and standard deviations. Comparison was done using chi square, Pearson's correlation was used to determine the relationship between MUST and MNA of the elderly with significance level ($p < 0.05$). Blood samples was used to determine Serum ferritin level of 10% sub sample of the sample size. Majority (62.9%) of the elderly were at risk of malnutrition,35. 0% were normal and 2.1% were malnourished. About 4.5% were placed on high risk by MUST, 88.7% on low risk and 6.8% on medium risk. Most of the iron rich food were consumed by the elders, occasionally consumption of iron rich food have the highest percentage. The elderly are all within the normal serum ferritin level range. Significant relationship ($p < 0.05$) existed between MNA and MUST.There is no Correlation relationship between Iron Status and Nutritional Vulnerability ($p>0.05$). Most of the elderly are nutritionally at risk of malnutrition despite their normal serum ferritin level.

OE34

Household food insecurity in a rural Southeast Nigerian community: Relationship with household characteristics

Ayogu Rufina N. B. and Ani Chinwendu
Department of Nutrition and Dietetics, University of Nigeria, Nsukka.
rufina.ayogu@unn.edu.ng

KEYWORDS: Food Insecurity, Monthly, Annual, Households,

BACKGROUND:
Food insecurity (FI) has been identified as an underlying cause of undernutrition (1). This study assessed monthly and annual food security status (MAFSS) of rural households in Nsude, Udi LGA and determined their relationships with household characteristics.

MATERIALS AND METHODS:
This is a cross-sectional survey of 360 households selected through multistage sampling. Monthly and annual food insecurity access scales were used to assess household food security (FS). Chi square of SPSS (version 23) was used in data analysis.

RESULTS AND DISCUSSION:
Mild (7.5%), moderate (37.8%) and severe (38.6%) monthly FI were identified; only 16.1% were food secure contrary to earlier report (2). The implication is high prevalence of undernutrition especially among vulnerable persons. Annual FSS showed that 8.6% were food secure; 53.9% were food insecure (FI) without hunger, 29.4% were FI with moderate hunger and 8.1% with severe hunger. Occupation was strongly associated with monthly ($P<0.01$) and annual ($P<0.001$) FSS, and farming activity ($P<0.001$) with monthly FSS alone. Similar findings have been reported (3). These imply that improving household occupations and varieties of farming activities may improve MAFSS of rural households.

Table 1: Relationship of monthly and annual household food insecurity with household characteristics

Variables	Food	Mild FI	Moderate	Severe FI	Total	P value
Occupation of household head						
Unemployed	1(1.7)	4(14.8)	5(3.7)	18(12.9)	28(7.8)	
Self-employed	45(77.6)	15(55.6)	114(83.8)	99(71.3)	273(75.8)	0.003**
Not self-employed	12(20.7)	8(29.6)	17(12.5)	22(15.8)	59(16.4)	
Total	**58(16.1)**	**27(7.5)**	**136(37.8)**	**139(38.6)**	**360(100.0)**	
Educational background of household head						
No formal education	9(15.5)	3(11.1)	11(8.1)	16(11.5)	39(10.6)	
≤secondary	29(50.0)	13(48.2)	93(68.4)	84(60.4)	219(61.0)	0.241
>secondary	20(34.5)	11(40.7)	32(23.5)	39(28.1)	102(28.4)	
Total	**58(16.1)**	**27(7.5)**	**136(37.8)**	**139(38.6)**	**360(100.0)**	
Household monthly income (Naira)						
<50,000	25(43.1)	21(77.8)	82(60.3)	87(62.6)	215(59.7)	0.013*
≥50,000	33(56.9)	6(22.2)	54(39.7)	52(37.4)	145(40.3)	
Total	**58(16.1)**	**27(7.5)**	**136(37.8)**	**139(38.6)**	**360(100.0)**	
Household size (persons)						
≤6	39(67.2)	24(88.9)	91(66.9)	97(69.8)	251(69.7)	0.319
>6	19(32.8)	3(11.1)	45(33.1)	42(30.2)	108(30.3)	
Total	**58(16.1)**	**27(7.5)**	**136(37.8)**	**139(38.6)**	**360(100.0)**	
Having a household farm land						
No	4(6.9)	2(7.4)	11(8.1)	12(8.6)	29(8.1)	0.980
Yes	54(93.1)	25(92.6)	125(91.9)	127(91.4)	331(91.9)	
Total	**58(16.1)**	**27(7.5)**	**136(37.8)**	**139(38.6)**	**360(100.0)**	
Household farming activity						
Crop farming	40(69.0)	23(85.2)	114(83.8)	82(58.9)	259(69.2)	
Small ruminant	8(13.8)	0(0.0)	9(6.7)	47(33.8)	64(19.4)	
Livestock farming	6(10.4)	2(7.4)	2(1.5)	3(2.2)	13(3.9)	
Fishery	0(0.0)	0(0.0)	0(0.0)	1(0.7)	1(0.3)	
Crop and small ruminant farming	2(3.4)	1(3.7)	7(5.1)	3(2.2)	13(3.9)	
Crop and livestock farming	1(1.7)	1(3.7)	3(2.2)	3(2.2)	8(2.4)	
Crop, small ruminant and livestock	1(1.7)	0(0.0)	1(0.7)	0(0.0)	2(0.6)	0.000***
Total	**58(16.1)**	**27(7.5)**	**136(37.8)**	**139(38.6)**	**360(100.0)**	
	Annual household food security status					
	Food	**FIWH**	**FIWMH**	**FIWSH**	**Total**	**P value**
Occupation of household head						
Unemployed	0(0.0)	5(2.6)	16(15.1)	7(24.1)	28(7.8)	
Self-employed	23(74.2)	160(82.5)	72(67.9)	18(62.1)	273(75.8)	0.000***
Not self-employed	8(5.8)	29(14.9)	18(17.0)	4(13.8)	59(16.4)	
Total	**31(8.6)**	**194(53.9)**	**106(29.4)**	**29(8.1)**	**360(100.0)**	
Educational background of household head						
No formal education	1(3.2)	15(7.7)	17(16.0)	5(17.2)	38(10.6)	
≤Secondary	15(48.4)	119(61.4)	69(65.1)	17(58.6)	219(61.0)	0.010*
>Secondary	15(48.4)	60(30.9)	20(18.9)	7(24.2)	102(28.4)	
Total	**31(8.6)**	**194(53.9)**	**106(29.4)**	**29(8.1)**	**359(100.0)**	
Household monthly income (Naira)						
<50,000	13(41.9)	106(54.6)	76(71.7)	20(69.0)	215(59.7)	0.004**
≥50,000	18(58.1)	88(45.4)	30(28.3)	9(31.0)	145(40.3)	
Total	**31(8.6)**	**194(53.9)**	**106(29.4)**	**29(8.1)**	**360(100.0)**	
Household size (persons)						
≤6	17(54.8)	140(72.2)	73(68.9)	21(72.4)	251(69.7)	0.388
>6	14(45.2)	54(27.8)	33(31.1)	8(27.6)	108(30.3)	
Total	**31(8.6)**	**194(53.9)**	**106(29.4)**	**29(8.1)**	**360(100.0)**	
Having a household farm land						
No	3(9.7)	19(9.8)	6(5.7)	1(3.4)	29(8.1)	0.466
Yes	28(90.3)	175(90.2)	100(94.3)	28(96.6)	331(91.9)	
Total	**31(8.6)**	**194(53.9)**	**106(29.4)**	**29(8.1)**	**360(100.0)**	
Household farming activity						
Crop farming	26(83.9)	140(72.2)	73(68.9)	20(69.0)	259(71.9)	
Small ruminant	3(9.7)	35(18.1)	20(18.9)	6(20.7)	64(17.8)	
Livestock farming	1(3.2)	9(4.6)	3(2.8)	0(0.0)	13(3.6)	
Fishery	1(3.2)	0(0.0)	0(0.0)	0(0.0)	1(0.3)	
Crop and small ruminant farming	0(0.0)	6(3.1)	6(5.6)	1(3.4)	13(3.6)	
Crop and livestock farming	0(0.0)	2(1.0)	4(3.8)	2(6.9)	8(2.2)	
Crop, small ruminant and livestock	0(0.0)	2(1.0)	0(0.0)	0(0.0)	2(0.6)	0.180
Total	**31(8.6)**	**194(53.9)**	**106(29.4)**	**29(8.1)**	**360(100.0)**	

FI, Food insecurity *FIWH*, Food insecurity without hunger. *FIWMH,* Food insecurity with moderate hunger *FIWSH,* Food insecurity with severe hunger

*P<0.05 **P<0.01 ***P<0.001.

Food insecurity with hunger means that at least one household member experienced hunger in the 12 months preceding the study.

CONCLUSION AND RECOMMENDATION: MAFSS of rural households were functions of occupation and farming activities. Improving household farming capacities is therefore recommended.

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PE35

Micronutrients And Microbial Load Assessment Of Vended Jollof Abacha: A Cassava Based Traditional Food

Okudu, H.O and Nzenwa, N.A

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

KEYWORDS: Jollof Abacha, Micronutrients, Microbial Load, Vegetables

BACKGROUND:

Jollof abacha is a cassava based traditional diet commonly consumed in South-eastern Nigeria. The food is majorly prepared and served cold with raw vegetables. This work was designed to assess the micronutrients and microbial load of jollof abacha.

MATERIALS AND METHODS

Samples of jollof abacha were randomly collected from food vendors at five different locations in Umudike environs. The samples were subjected to chemical and microbial tests using standard methods. Means and standard deviations were calculated. Analysis of Variance (ANOVA) was used to compare the means and mean separation was done using Duncan multiple range test. **Results and Discussion** Mineral values varied in all the samples. Zinc ranged between 1.85 to 6.16mg/100g, Fe (3.23 to 10.30mg/100g), Cu (0.03 to 1.07mg/100g) with sample A having the highest Zn, Fe, and Cu (6.16, 10.30 and 1.07mg/100g) values and sample C having the lowest Zn, Fe and Cu values (1.85, 3.23 and 1.07mg/100g). Variation in their mineral compositions could be a function of quantity of ingredients used by each vendor. β-carotene ranged between 1420 – 3010 μg/100g. High β-carotene obtained in the samples could be attributable to usage of raw palm oil and vegetables in the preparation of jollof abacha. β-carotene is a pro-vitamin A needed for vital body functions (1). Other vitamins obtained in appreciable amounts are vitamins B_1 (0.41 – 1.22 mg/100g) and B_3 (0.42 – 1.61 mg/100g). Microbial

load tests revealed high values of total coliform count (3.6 x10^6 - 5.1 x 10^9 cfu/g), fungal count (4.8 x 10^7 – 9.7 x 10^9 cfu/g) and total aerobic count (3.3 x 10^8 – 6.3 x 10^{11} cfu/g) in most of the samples. Microbial load of >10^6 cfu/g in any ready- to- eat food is unacceptable (2).

Table 1: Micronutrients and microbial loads of jollof abacha

Minerals	Sample A	Sample B	Sample C	Sample D	Sample E
Iron (mg)	7.43^b± 0.04	10.30^a ±0.02	3.23^e± 0.03	6.75^c ±0.01	6.11^d± 0.02
Zinc (mg)	3.71^b± 0.03	6.16^a ±0.01	1.85^e ±0.02	1.93^d ±0.02	2.18^c ±0.02
Copper (mg)	0.12^d ±0.01	1.07^a± 0.03	0.03^e ±0.01	0.82^b± 0.01	0.41^c ±0.02
Vitamins					
B-carotene(mcg)	4820^a± 0.02	1420^e ±0.02	3010^b± 0.03	2820^c ±0.02	2750^d± 0.02
Vitamin B_1(mg)	1.49^a ±0.01	0.41^{de}± 0.02	1.22^b ±0.01	0.39^{de}± 0.02	1.03^e ±0.01
Vitamin B_3(mg)	2.63^a ±0.01	0.42^e± 0.03	1.18^d ±0.02	0.87^c±0.02	1.61^b ±0.02
Microbial load (cfμ/g)					
Total aerobic plate count	3.3^ex10^8± 0.20	6.3^ax10^{11}± 0.10	4.4^dx10^{10}± 0.30	2.7^bx10^{11}± 0.30	8.6^cx10^{10} ±0.50
Total fungal count	4.8^e x10^7± 0.10	9.7^ax 10^9± 0.05	5.4^dx 10^8± 0.00	6.2^bx10^9± 0.10	7.2^cx10^8± 0.15
Total coliform count	2.5^e x10^3 ±0.00	5.1^a x10^9± 0.20	3.6^dx10^6 ±0.20	8.1^bx10^8± 0.10	5.1^cx10^6 ±0.05

Values are means ± standard deviation of duplicate samples
a-e Means with similar superscripts are not significantly different (p>0.05)

CONCLUSION

The study showed that jollof abacha is a good source of β-carotene, vitamin B_1, Fe and Zn but it is highly susceptible to micro-organisms.

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PE36

Association of Infant Feeding Practices and Food Neophobia Among Pre-School Children in Orogun Community, Ibadan

SAMUEL FOLAKE O[1]., *OKONKWO ELIZABETH M.[2]

[1]Department of Human Nutrition, College of Medicine, University of Ibadan, Ibadan, Oyo State Nigeria

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

elizabethokonkwo43@gmial.com

KEYWORDS: Breastfeeding, Complementary Feeding, Food Neophobia, Exclusive Breastfeeding

BACKGROUND:

The second year of life marks the transition from breast milk and complementary foods to family foods. The infant feeding practices employed by mothers are critical determinant(s) of nutrient intake and prevention of feeding problems such as food neophobia.

OBJECTIVE:

This study was carried out to assess the relationship of infant feeding practices and food neophobia among pre-school children in Orogun community, Ibadan.

METHODOLOGY:

Three hundred and seventy mothers of pre-school children were selected using a systematic random sampling technique from a pre-survey house to house list of eligible children. A semi-structured questionnaire which included socio-demographic characteristics, retrospective breastfeeding practice, retrospective complementary feeding practice and food neophobia scales were used to elicit information from the respondents. Data were analysed using descriptives and logistic regression

RESULTS:

Breastfeeding initiation within the first one hour was 54%, exclusive breastfeeding rate was only 26.8% and only 38% of the mothers had a good breastfeeding practice. Timely initiation of complementary feeding was 54%, 92% continued breastfeeding but only 7% of mothers breastfed until 24 months. Prevalence of food neophobia was 35%. This was significantly associated with sex. More than half (52%) of the food neophobic children were boys. Logistic regression analysis showed that the odds for food neophobia was higher among children who were initiated to breastfeeding late (OR = 1.45, 95% CI: 0.886 – 2.31), children that were not breastfed on demand (OR = 1.766, 95% CI: 0.925 – 3.372) and those that were not exclusively breastfed for six months (OR = 1.366, 95% CI: 0.834 – 2.240). Odds for food neophobia was higher among children who commenced complementary food before six months (OR = 1.473, 95% CI: 0.787 – 2.760). The new foods rejected most were from fruits and vegetables group. Maternal coping strategies with their child's food neophobia were mothers' participation in eating, modelling, and use of reward.

Table 1: Logistic Regression for Association of Infant feeding practice with Food neophobia

Indicators	Variables	Odd Ratio (95% CI)
Breastfeeding initiation		
	Within the first one hour	Reference
	After the first one hour	1.455 (0.886 – 2.891)
Exclusive breast feeding		
	Yes	Reference
	No	1.366 (0.834- 2.240)
Initiation of CF		
	Timely (at six months)	Reference
	Early (before six months)	1.020 (0.633 – 1.646)
	Late (after six months)	1.473 (0.787 – 2.760)

CONCLUSION:
The study revealed that there are suboptimal infant feeding practices, and these practices were associated with food neophobia.

IMPLICATION FOR POLICY:
There is need for early nutrition intervention; this should include community based approaches to promote the adherence of recommended infant feeding practice.

REFERENCE:
Response for those performing the recommended IFP

OE37

Proximate And Functional Properties Of Pudding Made From Unripe Plantain, Soyabeans And Coconut Flour Blends For Diabetes Management

Oluwafunke O. Akinbule[1], Oluwatosin O. Eniayekan[1], Adebukola T. Omidiran[2] and Solomon T. Kareem[3]
[1]Department of Nutrition, Federal University of Agriculture Abeokuta;
[2]Department of Food Science and Technology, Federal University of Agriculture Abeokuta;
[3]Department of Nutrition and Dietetics, Federal Teaching Hospital, Gombe

KEYWORDS: Unripe Plantain, Nutrient, Sensory Properties, Diabetes Management

BACKGROUND:
Unripe plantain is a low glycemic, low protein food crop which has been majorly prescribed for diabetes management [1]. Diets high in fibre, protein and low in glycemic index have been shown to reduce the risk of diabetes progression. The incorporation of locally available high protein and dietary fibre food crops to unripe plantain will bring about variety in foods available for diabetics and also promote the

affordable, easily accessible and sustainable management of diabetes, particularly among low-income groups. This study therefore determined the proximate composition, functional and sensory properties of pudding made from unripe plantain, soya bean and coconut flour blends.

MATERIALS AND METHODS:

Mature unripe plantain (*Musa paradisiaca*), soybeans (*Glycine max*) and coconut (*Cocos nucifera*) were purchased at Osiele market in Abeokuta, Ogun state. The unripe plantain, soybean and coconut were processed into flour. Puddings were made using five formulations of unripe plantain:soyabean:coconut flour blends (90:5:5, 80:10:10, 70:15:15, 60:20:20, 50:25:25). Each formulation was prepared with equal proportion of blended hot pepper (31ml), onions (20g), palm oil (30ml), bouillon cube (4g), water (218ml) and salt (4g). Cooking was done in a steam jacketed pot for 15 minutes at 60 ^{0}C. Pudding samples were cooled and analyzed for proximate content, bulk density (BD), water absorption capacity (WHC), swelling capacity (SC) and least gelatinization (LG) using standard methods. Twenty trained panelists were used to evaluate the colour, flavour, texture, taste, moldability and overall acceptability of the product using a 9-point hedonic scale, where "9" represents like extremely and "1" represents dislike extremely. Data was analyzed using means and standard deviation. ANOVA was used to test for differences between means at $p<0.05$ and means were separated using Fischer's least significant difference.

RESULTS AND DISCUSSION:

The protein, fat and fibre contents in the samples increased with increase in the soyabean and coconut flours concentration. There were significant ($p<0.05$) difference in the carbohydrate, protein and fat contents, as well as BD, WHC, SC and LGC of most of the formulations. Samples A and E had the highest overall acceptability.

Table 1: Proximate composition, functional and sensory properties of pudding made from unripe plantain, soyabean and coconut flour blends

	Proximate composition						
Sample	Formulation	Moisture	Carbohydrate	Protein	Fat	Ash	Crude Fibre
A	UPF_{90}: SF_5:CF_5	60.70±0.67^{b}	32.02±0.18^{a}	2.08±0.05^{e}	3.88±0.07^{c}	1.47±0.02^{b}	0.11±0.00^{d}
B	UPF_{80}:SF_{10}:CF_{10}	62.72±0.04^{a}	28.44±0.01^{c}	3.08±0.00^{d}	4.41±0.00^{d}	1.23±0.02^{d}	0.12±0.00^{d}
C	UPF_{70}:SF_{15}:CF_{15}	58.65±0.43^{d}	29.40±0.22^{b}	3.95±0.02^{c}	6.39±0.02^{c}	1.45±0.02^{bc}	0.20±0.02^{c}
D	UPF_{60}:SF_{20}:CF_{20}	59.91±0.70^{c}	25.71±0.51^{d}	4.78±0.06^{b}	7.94±0.11^{b}	1.43±0.01^{c}	0.24±0.00^{b}
E	UPF_{50}:SF_{25}:CF_{25}	58.30±0.18^{d}	25.14±0.05^{e}	6.11±0.05^{a}	8.66±0.05^{a}	1.53±0.03^{a}	0.27±0.00^{a}
	Functional Properties						
Sample	Formulation	Bulk density (g/cm3)	Water holding capacity	Swelling capacity	Least Gelation Conc.		
A	UPF_{90}: SF_5:CF_5	0.32±0.01^{a}	69.59±0.55^{b}	164.62±3.92^{a}	9.23±0.12^{d}		
B	UPF_{80}:SF_{10}:CF_{10}	0.28±0.00^{d}	67.76±0.38^{c}	147.99±0.14^{b}	9.51±0.27^{c}		
C	UPF_{70}:SF_{15}:CF_{15}	0.32±0.00^{b}	63.22±0.34^{e}	147.64±1.65^{b}	11.71±0.03^{b}		
D	UPF_{60}:SF_{20}:CF_{20}	0.29±0.01^{c}	65.98±1.26^{d}	138.53±1.84^{d}	11.71±0.09^{b}		
E	UPF_{50}:SF_{25}:CF_{25}	0.27±0.00^{e}	75.17±0.35^{a}	143.55±0.40^{c}	13.68±0.12^{a}		
	Sensory properties						
Sample	Formulation	Colour	Palatability	Texture	Taste	Mold ability	Overall acceptability
A	UPF_{90}: SF_5:CF_5	6.40±1.50^{a}	6.65±0.93^{a}	7.15 ± 1.56^{a}	6.55±1.63^{a}	7.30±1.97^{a}	6.70±1.52^{a}
B	UPF_{80}:SF_{10}:CF_{10}	6.30±1.45^{a}	6.48±1.17^{ab}	6.67 ± 1.93^{a}	6.05±2.16^{a}	7.05±1.57^{a}	6.62±1.46^{a}
C	UPF_{70}:SF_{15}:CF_{15}	5.90±1.48^{a}	5.70±1.66^{b}	6.25 ± 1.55^{a}	5.65±2.23^{a}	6.55±1.47^{a}	6.25±1.62^{a}
D	UPF_{60}:SF_{20}:CF_{20}	6.55±1.64^{a}	6.10±1.9^{ab}	6.40 ± 1.85^{a}	6.30±1.87^{a}	7.05±1.56^{a}	6.50±1.61^{a}
E	UPF_{50}:SF_{25}:CF_{25}	6.45±2.19^{a}	6.45±1.50^{ab}	6.55 ± 1.57^{a}	6.65±1.84^{a}	7.05±1.47^{a}	6.70±1.38^{a}

UPF- unripe plantain flour, SF- soyabean flour, CF- coconut flour. Values are means of duplicate determination ± standard deviation. Means on the same column with different superscript differed significantly (p 0.05)

CONCLUSION AND RECOMMENDATIONS

Addition of soyabean and coconut flour to unripe plantain pudding reduced the carbohydrate contents and hence increased the protein and fat contents. The profile of the fat should however be evaluated to ascertain its safety in diabetes management.

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PE39

Ibadan-Kids Nutrition Health Survey: results and future considerations for dietary intake

Rasaki Ajani Sanusi, [1] Dantong Wang, [2] Oluwaseun Ariyo, [1] Toluwalope E. Eyinla, [1] Marie Tassy, [2] Alison L. Eldridge, [1] Anuoluwapo Ogundero, [1] Oluwatosin Leshi, [1] Yvonne Lenighan, [2] Shirley Isibhakhomen Ejoh, [1] Elizabeth Aleru

Sanusi, R.A., Wang D., Ariyo, O., Eyinla, T.E., Tassy, M., Eldridge, A. I., Ogundero, A., Leshi, O., Ejoh, S. I. and Aleru, E.

[1]*Department of Human Nutrition and Dietetics, University of Ibadan, Nigeria*

[2]*Nestlé Research Center, Lausanne, CH-1000, Switzerland*

Sanusiadegoke2003@gmail.com

KEYWORDS: Child Nutrition, Diet, Micronutrient Adequacy, Food Intake

BACKGROUND

Adequate nutrition from childhood through adolescence is important for ensuring optimal growth, development with long term positive health benefits. In Nigeria, there are sparse reports on dietary intake and nutritional status of children older than five and less than 12 years. The objective of the Ibadan Kids Nutrition and Health Survey (I-KNHS) was to assess (among other aims) the diet of children aged 4-13.9 years and evaluate its contribution to their nutrient intake.

METHODOLOGY

The I-KNHS study used a descriptive, cross-sectional approach to sample 944 children from local government areas of Ibadan. Food intake and portions consumed were collected using the 24hr dietary recall methodology in which weight equivalents of food items were estimated using price and household measures. Body weight and height data were collected using standard procedures. Energy and nutrient content of foods consumed were estimated using food composition tables. Estimated Average Requirement (EAR) and Estimated Energy Requirement (EER) were used to ascertain adequacy among children and were calculated for each individual using Institute of Medicine (IOM) references.

RESULTS AND DISCUSSION

The study found 1.9% to be obese, 37(3.9%) were overweight, and thin children were 149 (15.8%) and stunted children 137(14.6%). The top foods consisted of mainly Cassava, Rice, Yam, and legume products. The frequency of consuming protein-rich and micronutrient dense foods was found to be low. The resulting mean nutrient intakes compared against respective EAR as shown in Figures 1-2 reveal that despite an apparent adequacy of the diet to meet macronutrient requirements, key micronutrients were generally found inadequate in the diet of the children.

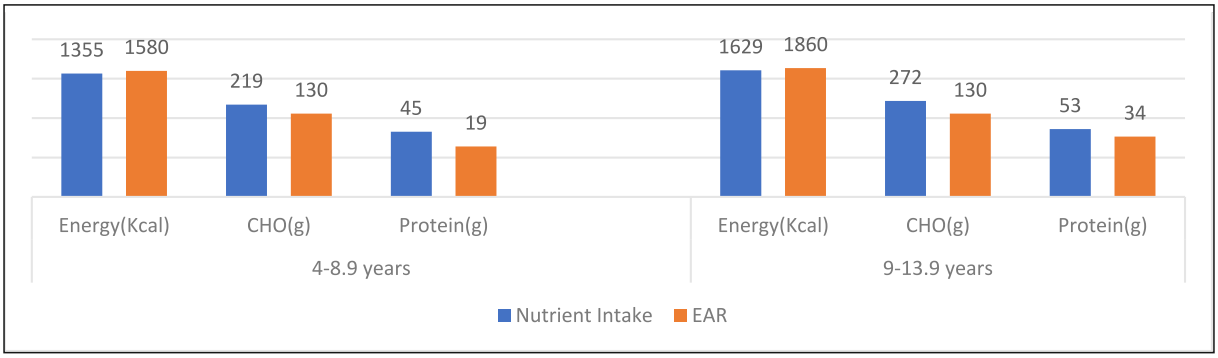

Figure 1. Mean of macronutrients compared with Estimated Average Requirements (EAR)

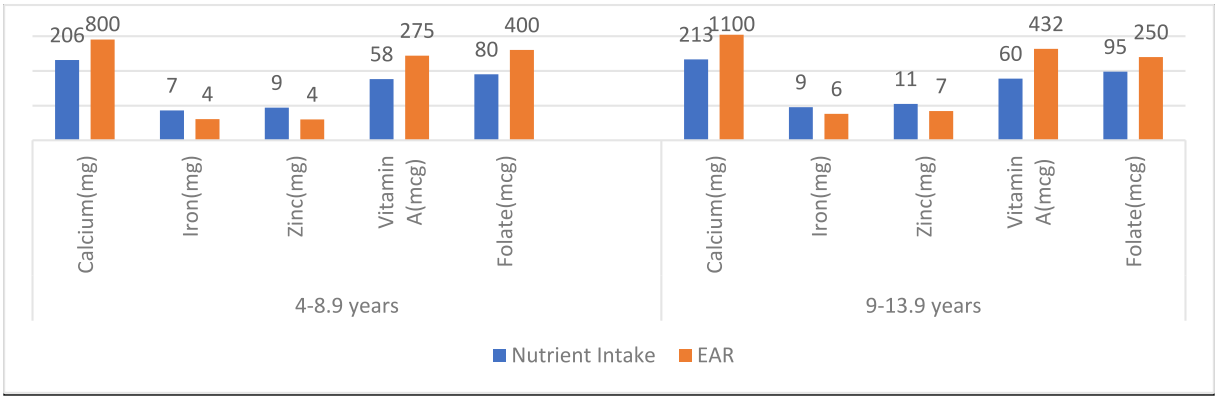

Figure 2. Mean of key micronutrients compared with Estimated Average Requirements (EAR)

CONCLUSION

The obvious need for nutrient dense foods (especially micronutrient rich foods) in the children's diet is a key finding of this study. The nutrient gaps identified in this study are useful to guide appropriate actions that promote nutrition and health among this subpopulation.

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OE40

Microbial Quality of *Awara* Produced from Soybean and Cowpea Milk

Petrol B. B[1], Hashim H[2], Falmata A. S[1], Usman M[1]. and Modu S[1].
[1]*Department of Biochemistry, University of Maiduguri*
[2]*Department of Biochemistry, Yobe State University*
bintubukar@yahoo.com

KEYWORDS: *Awara*, Microbial Quality, Soybean and Cowpea

BACKGROUND:
In developing countries, lack of sufficient protein in the diet of a large percentage of the population is becoming a major setback for human development. Efforts are aimed at finding alternative sources of protein from legume seeds in order to meet protein demands in places where animal protein is either grossly inadequate or relatively expensive. In such areas, legumes are the most important high protein foods. In developing countries, including Nigeria there is a renewed awareness on the utilization of legumes. This is because they are regarded as versatile functional ingredients that are nutritionally similar to meat, and serve as replacements for animal protein [1]. Among the legumes, soya bean and Cowpea are the most widely cultivated. They are very good sources of dietary protein that rank high among the great world protein sources '*Awara*' is an unfermented soft cheese like food produced from fresh hot soya bean and cowpea milk with either a salt or an organic acid from fruit such as lemon [2]. It is highly nutritious with adequate amino acid composition [2,3]. Thus, it can be used as a source of dietary amino acid However, no documented evidence on the microbial quality of '*awara*' from soya bean and cowpea. This study was aimed at investigating the microbial quality of *awara* produced from fermented soya bean and cowpea milk.

MATERIAL AND METHODS:
Soybean, cowpea, vinegar, lemon juice, tamarind fruit extracts, alum and citric acid were obtained from Maiduguri Monday Market, Borno State. The *awara* was produced from 100% soybean, 100% cowpea, a 60% soybean: 40% cowpea and 50% soybean: 50% cowpea by curdling milk, coagulant addition, the curds were pressed to remove excess water and cut into blocks. Samples were collected in sterile containers and immediately taken to the laboratory for analysis. The samples were blended, serially diluted and subjected to microbial analysis by pour plate count and standard biochemical test for identification of isolate with reference to systematic bacteriological manuals.

RESULTS AND DISCUSSION:
Results obtained indicated that the *awara* produced from 100% soybean had a lower bacterial count than the *awara* produced from 100% cowpea, 60:40: and 50:50 samples, all with a value of ($7x10^3$), ($9x10^3$), ($12x10^3$), and ($10x10^3$) respectively. The microorganisms isolated showed that *staphylococcus*, *bacillus subtitles*, *Echericha coli, pseudomones sp, streptococcus and saccharomyces cerevisca* had 100% Occurrence while *salmonella sp*, *shigella* and *rhizopus oryza* had 75% occurrence. There were low microbial counts in the 100% soybean *awara* compared to *awara* from cowpea, 60:40 and 50:50 *awara*. The high bacterial count observed in the *awara* produced might be attributed to the presence of heat resistance and post handling contamination. The presence of *Echericha coli, salmonella sp* and *shigella* might be due to post contamination [1].

Table 1: Total Bacterial Count of *Awara* Produced from Soybean and Cowpea

Sample	Cfu/g
SBA	7×10^3
CPA	9×10^3
SB:CP1	12×10^3
SB:CP2	10×10^3

SBA – Soybean *awara* 100%
CPA – Cowpea *awara* 100%
SB:CP1 – 60% soybean *awara*: 40% cowpea *awara*
SB:CP2 – 50% soybean *awara*: 50% cowpea *awara*

Table 2: Microorganisms Isolated and Percentage Occurrence of *Awara* Produced from Soybean and Cowpea.

Microorganism	SBA	CPA	(60:40) SB:CP1	(50:50) SB:CP2	% Occurrence
Staphylococcus	+	+	+	+	100%
Bacillus subtilis	+	+	+	+	100%
Salomenella Sp	-	+	+	+	75%
Escherichia coli	+	+	+	+	100%
Shigella	-	+	-	+	75%
Pseudomonas Sp	+	+	+	+	100%
Streptococcus	+	+	+	+	100%
Saccharomyces cerevisae	+	+	+	+	100%
Rhizopus oryza	-	+	+	+	75%

SBA – Soybean *awara* 100%
CPA – Cowpea *awara* 100%
SB:CP1 – 60% soybean *awara*: 40% cowpea *awara*
SB:CP2 – 50% soybean *awara*: 50% cowpea *awara*

CONCLUSION:

From the results in this study, it can be concluded that the *awara* produced from 100% soybean has the lowest microbial count than other *awara* produced. It is recommended to apply basic food hygenic practices to minimize the introduction of coliform and other pathogens.

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OE41

Nutrient Composition And Sensory Evaluation Of Drink Prepared From Roselle Calyx (Zobo) (*Hibiscus Sabariffa*), Moringa *Olifera* And Date Palm (*Phoenix Dactylifera.L.*)

Uche S. V., *Chukwuka O. F. & Nnam N.M.
Department of Nutrition and Dietetics, University of Nigeria, Nsukka Enugu State.
Oluebube.chukwuka@unn.edu.ng

KEYWORDS: Nutrient, Roselle, Date palm, Sensory Evaluation

BACKGROUND AND OBJECTIVE:
In many developing countries including Nigeria, Roselle calyx has been under exploited despite the existing potential for a wider application in the food processing and other technological applications (1). There are health and nutritional claims that it has health benefits such as soothing colds, opening blocked nose, clearing up mucous, promoting proper kidney function, helping digestion and helping reduce fever (2). There are no studies on quality changes in the physico-chemical, phytochemicals and nutritional composition at various processing temperature and time regimes as well as storage at various conditions (2). The aim of the study was to determine the nutrient composition, and sensory evaluation of drink made from Roselle calyx (zobo) (Hibiscus *sabdariffa*), Moringa *olifera* and date palm (Phoenix *dactylifera*).

MATERIALS AND METHODS:
Beverage made from Roselle *calyx* (Hibiscus *sabdariffa*), Moringa *olifera* and Date palm (Phoenix *dactylifera. l*) (RMD) was prepared in the following ratios: RMD1a being 50:50 with boiled dates, RMD1b 50:50 with blended dates, RMD2a 60:40 with boiled dates, RMD2b 60:40 with blended dates and RMD3 100% Roselle, pineapple, & date palm (Control). A 9-point hedonic scale was used to determine the sensory properties and general acceptability of the drinks. Twenty panelists involving undergraduate students selected from the Departments of Home Science, Nutrition and Dietetics and Food Science and Technology, University of Nigeria Nsukka were used for the sensory evaluation. RMD1a, RMD2b and RMD3 ranked highest in their sensory properties and general acceptability scores and were therefore, subjected to chemical analysis. Nutrient analysis (proximate compositions, vitamin composition and mineral composition) was determined using standard laboratory procedures according to AOAC and Pearson. Data collected were analyzed using the Statistical software SPSS version 21 (Statistical Product for Service Solution). Results were reported as means and standard deviation, analysis of variance and Duncan Multiple Range Test was used to separate and compare means respectively.

RESULTS AND DISCUSSION:
Result of sensory evaluation showed that RMD1a ranked highest in colour (7.75), taste (6.35), flavour (6.45) while RMD2b ranked highest in general acceptability (6.10). The Proximate results showed that Moisture content ranged from 84.27 – 80.93%. Carbohydrates ranged from 15.01 - 10.90%; crude ash content ranged from 1.00 - 0.73% Crude protein content ranged from 0.64 - 0.45%, and crude fat content was 0.77 - 0.56%. Crude fibre content ranged from 2.54 - 2.13%. Vitamin results showed that Beta-Carotene content was highest in RMD3 (1.00mg), Thiamin content was highest in RMD2b (2.50mg). Ascorbic acid content was highest (17.48mg) in RMD1a and Alpha-Tocopherol content was highest in RMD2b (0.52mg). Mineral results showed that Iron content for RMD3 (6.63mg) was significantly ($p < 0.05$) higher than the other samples. Calcium content was highest in (0.46mg) RMD1a.

Magnesium content was highest in RMD3 (6.75mg). Potassium content was highest in RMD1a with 3.14mg.

Table 1: Sensory evaluation scores for roselle drink samples

SAMPLE	COLOUR	TASTE	FLAVOUR	GENETRAL ACCEPTABILITY
RMD1a	7.75^{a}	6.35^{a}	6.45^{a}	5.75^{b}
RMD1b	6.90^{a}	5.10^{a}	4.85^{a}	4.95^{b}
RMD2a	7.45^{a}	6.05^{a}	6.20^{b}	4.95^{c}
RMD2b	7.20^{a}	6.20^{a}	6.25^{a}	6.10^{a}
RMD3	7.30^{a}	5.05^{a}	5.05^{a}	4.35^{b}

n=3, values are represented as mean ± standard deviation means with the same superscript are statistically the same ($p < 0.05$); RMD1a = 50% roselle *calyx* leaves, 50% moringa *olifera* leaves with boiled date palm to taste; RMD2b = 60% roselle *calyx* leaves, 40% moringa *olifera* leaves with blended date palm to taste, RMD3 = 100% roselle *calyx* leaves, pineapple and date palm to taste

CONCLUSION AND RECOMMENDATION:

Sensory evaluation of the drinks labeled RMD2b showed appreciable consumer acceptability on other hand, the drink will contribute great to an adults' recommended intake for essential vitamins and minerals. This beverage is recommended for people of all age groups.

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PE42

Assessment of the Relationship between Malnutrition and Parasitic Infections among School Age Children in Selected Local Government Areas (LGAs) of Ogun State

Onabanjo O.O[1], Sanni S.A[1], Idowu O.M.O[1], Quadri J.A[2] & Lano-Maduagu A.T[3]
:[1]Federal University of Agriculture Abeokuta, Ogun State
[2]Olabisi Onabanjo University, Ago-iwoye, Ogun State
[3]University of Lagos, Akoka, Lagos

KEYWORDS: Malnutrition, Parasitic Infection, Malaria and Itns

BACKGROUND AND OBJECTIVES:
Parasitic infections such as hookworm, *ascaris lumbricides* and *P. falciparum* affect the mortality and quality of life of school age children (4) and this may occur as a result of high incidence of poverty and the interaction of endemic malaria, malnutrition and helminthiasis in Nigeria (5). This study assessed the inter-relationship between malnutrition and parasitic infection among school age children in selected Local Government Areas (LGAs) of Ogun state.

MATERIALS AND METHOD:
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 (3) and parasitic infections (stool examination (5) and Malaria screening (6) were also measured using standard procedures. Data were analyzed using frequency counts, percentages, means, standard deviations, correlation, T-test and Chi-Square.

RESULTS AND DISCUSSION:
Results showed that 36.5% of the respondent families earned less than two hundred thousand naira annually. Also, 43.0% and 62.0% of the mothers had secondary and tertiary education respectively. WASH practices showed that 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. Malaria was moderate in 32.1% but high in 24.4% of the children and the stool examination showed the presence of *Ascaris lumbricoides* and *Strongyloides* in 18.3% and 9.3% of samples respectively. Chi-square showed a significant association between maternal education and stunting ($p=0.014$), family income and stunting ($p=0.038$) and wasting ($p=0.003$). Correlation revealed a significant relationship between anaemia and stunting ($r=0.113$) and underweight ($r=0.104$).A positive relationship exist between malaria and stunting ($r=0.217$) and underweight ($r=0.207$) while *Ascaris lumbricoides* was positively related to wasting ($p=0.126$). Malaria currently accounts for nearly 110 million clinically diagnosed cases per year, 60 percent of outpatient visits, and 30 percent hospitalizations (2) with prevalence of 76 percent in the country (Nigeria) (7). Personal hygiene greatly reduces the burden of intestinal parasites (8), and this is due to the reason that proper personal hygiene breaks the chain of intestinal parasite transmission. The overall effect of these

results in growth retardation reduced mental development, school absenteeism, low academic performance, susceptible to malnutrition and infection (1).

CONCLUSION AND RECOMMENDATION(S):

This study concluded that a significant relationship exists between socio economic status, nutritional status and makers of infections in the children. Hence, the study recommended an operational research to determine how best to raise awareness of the importance of malaria and other infections in school-age children and on how to improve the use of established control measures such as insecticide treated nets (ITNs) in this age group.

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OE43

Evaluation of the Nutrient, Phytochemical And Antinutrient Constituents of Three Underutilized Food Leaves (*Dialum Guineense*, *Justicia Secunda* And *Eugenia uniflora*).

Udejiofor, U.S., Chukwuka, O.F. and Nnam, N.M.

Department of Nutrition and Dietetics, University of Nigeria, Nsukka Enugu State, Nigeria.
casandrauchenna1@gmail.com

KEYWORDS: *Dialum guineense*, *Justicia secunda*, *Eugenia uniflora,* Vitamins.

BACKGROUND:

Green leafy vegetables are part of the key component of balanced human diet, which serve as important sources of protective foods beneficial for health maintenance (1) and prevention of diet-related non-communicable diseases.

Objectives: The study evaluated the nutrient, phytochemical and antinutrient constituents of three underutilized food leaves (*Dialum guineense*, *Justicia secunda* and *Eugenia uniflora*).

MATERIALS AND METHOD:

D. guineense, *E. uniflora* and *J. secunda* were harvested from Junior Staff quarters, University of Nigeria Nsukka of Enugu State, Nigeria; destalked, thoroughly washed without salt and drained. The drained vegetables were then milled, packaged in air-tight container, labelled and stored in the refrigerator until the time of use. Proximate compositions, minerals, vitamins, phytochemical and antinutrient contents of the sample were determined in duplicate using AOAC standard methods of analyses (2). One way analysis of variance (ANOVA) and Duncan multiple range test was used to separate and compare means.

RESULTS AND DISCUSSION:

The protein and ash values of the three food leaves were low (<5%). Moisture content was significantly higher in *J. secunda* (76%). Fibre, carbohydrate and energy values of the three food leaves ranged between 1.94 to 2.96%, 4.22 to 5.50%, 9.95 to 25.87%, 105.63 to 201.36% respectively. *E. Uniflora* is significantly similar with *J. secunda* while *D. guineense* differ significantly ($P<0.05$) from the two in both ash value and fat value, with mean ranges of (1.94 to 3.06)% and (4.22 to 5.50)% respectively. The samples were poor sources of minerals, except *J. Secunda* which had high magnesium and calcium value of 243.45mg/100g and 171.44mg/100g respectively. The pro-vitamin A value was significantly higher ($P<0.05$) in *D. guineense* (10.40mg/100g), while *J. secunda* had significantly higher value in thiamine, riboflavin, Vitamin B6 and Vitamin C (0.06, 2.35, 0.38, 30.96)mg/100g respectively. Flavonoid was >5mg and differ significantly ($P<0.005$) in all the samples, with a mean range value of (5.0-11.5)mg/100g. The samples were low both in saponin and phenol (<5mg). Oxalate, tannin and phytate values were low in all in the samples, within the safe level (2.20mg, 0,15-0.20mg,5mg respectively).

Table 4.1: Vitamin composition of the three food leaves on fresh matter basis (per 100g)

Parameter	Pro-Vitamin A (mg)	Vitamin B1 (mg)	Vitamin B2 (mg)	Vitamin B3 (mg)	Vitamin B6 (mg)	Vitamin B9 (mg)	Vitamin C (mg)
D.guineense	$10.40^{b}\pm0.40$	$0.00^{a}\pm0.00$	$0.46^{a}\pm0.01$	$0.02^{a}\pm0.01$	$0.12^{a}\pm0.00$	$0.00^{a}\pm0.00$	$9.46^{a}\pm1.22$
E. uniflora	$8.91^{a}\pm0.19$	$0.01^{a}\pm0.00$	$0.92^{b}\pm0.01$	$0.25^{c}\pm0.01$	$0.13^{a}\pm0.02$	$0.00^{a}\pm0.00$	$12.89^{a}\pm1.20$
J. secunda	$8.26^{a}\pm0.03$	$0.06^{b}\pm0.00$	$2.35^{c}\pm0.03$	$0.18^{b}\pm0.00$	$0.38^{b}\pm0.02$	$0.00^{b}\pm0.00$	$30.96^{b}\pm0.00$

Mean±SD (n=2), Values in the same column bearing different superscript letters were significantly different ($P<0.05$)

CONCLUSION AND RECOMMENDATION:

The study shows that *Dialum guineense*, *Justicia secunda* and *Eugenia uniflora* are appreciably rich in protein, fiber, carbohydrate, energy and minerals, as well as rich sources of vitamins. These vegetables if consumed in sufficient amounts will contribute to human nutrient requirement for health maintenance and protection against hidden hunger and diet-related non communicable diseases. The result of the study will serve as a baseline information to add to the dietary diversity of foods consumed by households and increase their production.

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OE44

Glycemic Response of Fried Rice made from Four Rice Varieties Consumed in Nigeria

Ebene N.C., *Maduforo A.N., Onodugo N.G., Chikwendu J.N., Madukwe E.U., Agbo E.C. Umeakuka O.P., Aloysius-Maduforo M.C.

Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria.
aloysius.maduforo@unn.edu.ng

KEYWORDS:

BACKGROUND:
Rice is one of the most common staple foods consumed in Nigeria. Different varieties of rice are sold in Nigeria markets. Some of them are attributed to possess some therapeutic characteristics especially classified to be low in carbohydrates by assumptions and thus do not increase blood glucose rapidly. Also, rice is prepared in different forms in Nigeria such as jollof, boiled rice eaten with tomato stew/vegetable sauce or palm nut (banga) soup and fried rice. There is paucity of study comparing the glycaemic response of varieties of rice consumed in Nigeria. This study therefor determined the glycemic response of fried rice made from four rice varieties (brown rice, long grain [Foreign] rice, basmati rice and local short grain rice) consumed in Nigeria.

METHODOLOGY:
The rice samples were obtained from a local market in Enugu while only basmati rice was obtained from a shopping mall in Enugu, Enugu state. The recipes for the rice were standardized and it was prepared as fried rice. The available carbohydrate content was determined using standard methods. The evaluation of the glycaemic response, glycaemic index and glycaemic load of the four rice varieties prepared as fried rice were done using standard protocols [1]. 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 and turkey HSD test were used to compare the means. $P < 0.05$ was considered statistically significant.

RESULTS AND DISCUSSION:

The available carbohydrate content was significantly ($p < 0.05$) highest (17.24 g/100g) in brown rice and significantly ($p<0.05$) least (16.30g/100g) in basmati rice. The glycemic response of the four rice samples prepared as fried rice were statistically comparable ($p>0.05$). Local short grain rice had the least glycaemic index (28.16) while basmati rice had the highest (43.69). However, all the fried rice samples had glycaemic index classified as low [2]. The glycaemic load ranged from 4.29 in local brown rice to 7.21 in long grain rice. The low glycaemic index seen in the result which is usually lower than the values reported for rice boiled with water could be attributed to the ingredients added to the fried rice such as the oil content known to lower glycaemic index as well as the method of cooking [2,3]. Table 1 shows the available carbohydrate content, glycaemic index and glycaemic load of four rice varieties consumed in Nigeria.

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

Samples	Available carbohydrate g/100g	Glycaemic index	Glycaemic Load
Local brown rice	$17.24^{b}\pm0.96$	24.90	4.29
Long grain (Foreign) rice	$16.92^{ab}\pm0.67$	42.65	7.21
Basmati rice	$16.30^{a}\pm0.12$	43.69	7.12
Local short grain rice	$16.50^{ab}\pm0.13$	28.16	4.64

CONCLUSION:

The study provided a standardized recipe for fried rice that could be used in clinical, commercial, practical and household settings. The study also concluded that the local Nigerian rice species are suitable for diabetics and healthy adults as the glycaemic indexes of all the rice varieties compared were statistically similar.

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OE45

Evaluation of Nutrient Composition f Plantain and Cowpea Flour Blend

ONYEKE NKECHI G[1], ANOSHIRIKE, CYRIL O[*1]., EMEKA-OKAFOR EUGENIA N[3]., & EZE SCHOLASTICA C[1].,

[1] *Home Science and Management, University of Nigeria, Nsukka*

[2] *Nutrition and Dietetics, University of Nigeria, Nsukka*

[3] *Federal Polytechnic Oko, Anambra State*

Cyril.anoshirike@unn.edu.ng

KEYWORDS: Plantain, Cowpea, Composite Flour And Nutrient

BACKGROUND:

Composite flour is a mixture of flours developed either by total or partial replacement of wheat flour (1). Use of composite flour is increasing in developing countries especially Nigeria in various food production such as in bakery and pastry products because of economic, availability and nutritional advantages over wheat flour (2). Plantain (*Musa paradisiaca*) and cowpeas (*Vigna unguiculata* L) are among the staple food in the tropical regions of the world, with good source of carbohydrate and dietary protein, respectively and good source of vitamin A, B_6 and C as well as other mineral. Application of composite flours eliminate or reduce the importation of wheat flour, encourage diversity of it use, increase nutritional value, ensure good dietary quality and use of locally-grown crops as flour. Flours from Plantain and cowpea, are now used as ingredients in bakery industries, formulation of complementary foods and dietary diversity. Improving nutrients quality of diets and promoting food security could be achieved by processing the food into flours and making of composite blends of the flour. Hence, this study assesses the nutrient composition of plantain and cowpea flour blend.

MATERIALS AND METHOD:

Plantain and cowpea that was used in this study was obtained from Ogige main market in Nsukka Local Government of Enugu state. The Unripe plantain was washed, peeled, and sliced into pieces, sundried, milled, and sieved into smooth flour. The Beans was sorted, cleaned, soaked, drained, dehulled, boiled, and oven dried, milled and sieved into beans flour. The beans flour and the plantain flour were blended together in the ratio of 70%:30%, 30%:70%, 50%:50% respectively and coded as samples CPA, CPB and CPC and formulation of beans- plantain composite flour was achieved. Chemical analysis of the composite flours were done using a standard method and the sensory evaluation was carried out on the cookies produced using the composite flour. Data obtained from chemical and sensory evaluation was analyzed statistically using Statistical Product and Service Solution (SPSS version 23.0) and presented as Mean ± Standard deviation. One-way Analysis of variance (ANOVA) was used to determine the significance difference between variables while Turkey HSD-test was used to separate means at 5% probability level ($p < 0.05$).

RESULTS AND DISCUSSION: Result shows that flour sample CPA (70%:30% beans-plantain composite flour) content higher moisture (4.44%), Fat (2.95%), Protein (17.69%) and Iron (1.73 mg) which could be due increased in beans flour quantity in the composite flour. All the composite flours has low fat content, high carbohydrate, protein and ash content which accounted to high calcium, magnesium and phoshorus content in the flour samples. The composite flours contain an important nutrients and can be used to produce healthy pastry and complementary foods (2), This composite flour could be used in the

formulation of diet for children with severe acute malnutrition and with iron deficiency anemia. CPB has higher carbohydrate and 50% beans flour and 50% plantains flour composite blend (CPC) contains higher crude fibre (1.19%) and Ash (1.94%), Zinc (0.44 mg), Magnesium (157.5 mg), Calcium (517.65 mg) and Phosphorus (55.45 mg) depicted in table 2. This implies that composite flour of bean plantain 50%:50% contain high minerals and fibre content which could be used in preventing micronutrient deficiencies. The composite flours could be used as a food vehichle to solve microtrient deffiviencied.

Table 1: Proximate composition of beans –plantain composite flour

Sample	Moisture (%)	Fat (%)	Crude fiber (%)	Protein (%)	Ash (%)	Carbohydrate (%)
CPA	4.44 ± 0.01^{c}	2.95 ± 0.49^{b}	0.79 ± 0.00^{b}	17.69 ± 0.73^{c}	1.45 ± 0.01^{a}	72.20 ± 0.66^{a}
CPB	3.47 ± 0.00^{b}	1.93 ± 0.01^{a}	0.59 ± 0.00^{a}	11.21 ± 033^{a}	1.44 ± 0.01^{a}	81.38 ± 0.33^{c}
CPC	3.13 ± 0.03^{a}	2.93 ± 0.06^{b}	1.19 ± 0.01^{c}	13.59 ± 0.22^{b}	1.94 ± 0.04^{b}	77.24 ± 0.30^{b}

Table 2: Mineral contents of the beans-plantain composite flour

Samples	Iron(mg)	Zinc(mg)	Magnesium(mg)	Calcium(mg)	Phosphorus(mg)
CPA	1.73 ± 0.18^{a}	0.26 ± 0.00^{a}	143.04 ± 1.36^{b}	444.94 ± 4.33^{a}	44.09 ± 0.30^{b}
CPB	0.38 ± 0.01^{b}	0.38 ± 0.01^{b}	109.4 ± 0.14^{a}	507.78 ± 1.20^{b}	39.07 ± 1.54^{a}
CPC	0.44 ± 0.22^{c}	0.44 ± 0.22^{c}	157.5 ± 0.21	517.65 ± 0.00^{c}	55.45 ± 1.61^{c}

CONCLUSION AND RECOMMENDATION:

Study revealed that all the composite flour sample contain important nutrients such as carbohydrate, protein and minerals with low fat and fibre content because the mixture of the plantain and beans flour. Hence, the formulation of different food blends especially from legumes and root and tubers, or cereals and other food group flour is one sure way of improving the nutrient quality and diversifying the diet. It could be used in the formulation of complementary food and bakery products. Composite flour product, can improve food security and use in solving nutrition problems.

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PE46

Proximate and Energy Composition of White and Pro-Vitamin A Cassava Based Fufu

Ugwuoti R.C. [1], **Nwoye A.J.** [1], **Chukwu C.C.**[1], **Okwara C.C**[1,2], **Maduforo A.N.** [2]
[1]*Department of Nutrition and Dietetics, University of Nigeria Teaching Hospital*
[2]*Department of Nutrition and Dietetics, University of Nigeria Nsukka*
onahrita@yahoo.com

KEYWORDS: Cassava, Proximate, Energy, Fufu

BACKGROUND:
Cassava (*ManihotesculentaCrantz*) is one of the staple food crops in tropical parts of the world. It is the primary source of carbohydrates in sub-Saharan Africa (1) and ranks sixth among crops in global production index (2). In Nigeria, many varieties of cassava were classified under two main variants which are white and pro- vitamin A (yellow) variants (3).Though the white variety is popular, the yellow variety may have higher nutritional potentials. The study therefore determined the proximate and energy composition of cassava based swallows of the two varieties consumed in Enugu State.

MATERIALS AND METHODS
White and Pro-vitamin A fortified cassava (*ManihotSp*) tubers were harvested from a farm in Enugu East local government area, Enugu state, Nigeria. Healthy whole tubers were sorted out to ensure that the tubers used in this study were free from insect, rodent and microbial damage. The fresh pro-vitamin A cassava tubers were peeled, washed and processed into garri and *akpu*. The fresh white cassava tubers were peeled, washed and processed into white garri, yellow garri and *akpu*. The processes and stages in garri production involved hybridized trado –modern while akpu was processed using only the traditional method. The cassava tubers for garri production after being peeled and washed were grated using a milling machine to produce mash (palm oil was added in the portion for yellow garri at this point). The mash were packed in a clean sack bag and allowed to ferment for 72hours before pressing to remove water and then frying/roasting. Similarly, the cassava tubers for akpu production after being peeled and washed were soaked in water in an air tight container and left outside to ferment for 4 days. The fermented products were sieved into a sack bag, firmly tied and kept for water to drain. The samples were subjected to chemical analysis using standard methods to determine the proximate composition. The energy content was determined using Atwater factor for energy giving food nutrients. Descriptive statistics (mean and standard deviation) were used to present the data obtained while ANOVA and turkey HSD test were used to compare the mean.

RESULTS AND DISCUSSION
Table 1, revealed that cooked yellow garri had the highest energy value (123.06$\pm$1.2/100g) which could be attributed to the addition of palm oil during the processing. The fiber content of cooked yellow garri was significantly different ($p < 0.05$) from other samples. This suggests that cooked yellow garri may be a better alternative for faster bowel movement. Protein content was generally low as it ranged from 0.46g/100g in cooked yellow garri to 0.76g/100g in Akpu white. This suggests that protein deficiency disorder can be associated with frequent cassava consumption without proper supplementation (4). There was no significant difference ($p > 0.05$) in the ash content of the samples, which is an indication that cassava products are not good sources of minerals and needs to be supplemented (5).

Samples	Moisture 100g)	Protein /100g)	Fat (/100g)	Carbohydrate (/100g)	Fiber /100g)	Ash (g/100g)	Energy (kcal/100g)
Cooked white garri	$76.13^{c}\pm0.12$	$0.71^{bc}\pm0.11$	$0.87^{bc}\pm0.23$	$20.37^{c}\pm0.39$	$1.87^{a}\pm0.23$	$0.07^{a}\pm0.01$	$99.53^{c}\pm1.49$
Cooked yellow garri	$69.87^{a}\pm0.23$	$0.46^{a}\pm0.02$	$0.53^{ab}\pm0.12$	$25.66^{d}\pm0.29$	$3.45^{c}\pm0.12$	$0.03^{a}\pm0.01$	$123.06^{e}\pm1.27$
Cooked pro-vit A garri	$78.47^{e}\pm0.12$	$0.86^{cd}\pm0.04$	$0.40^{a}\pm0.00$	$18.55^{b}\pm0.15$	$1.67^{a}\pm0.23$	$0.05^{a}\pm0.01$	$87.92^{b}\pm0.49$
Akpu white	$71.73^{b}\pm0.23$	$0.76^{c}\pm0.09$	$0.73^{abc}\pm0.12$	$24.95^{d}\pm0.57$	$1.79^{a}\pm0.35$	$0.04^{a}\pm0.00$	$116.56^{d}\pm0.81$
Akpu pro-vit A	$76.93^{d}\pm0.12$	$0.55^{ab}\pm0.05$	$0.93^{c}\pm0.12$	$20.07^{c}\pm0.17$	$1.47^{a}\pm0.12$	$0.05^{a}\pm0.01$	$96.75^{c}\pm0.90$

Samples were analyzed in triplicates. Mean values with different superscript a – f in columns significantly ($p < 0.05$) differed

CONCLUSION AND RECOMMENDATION:

This study revealed that the various cassava tubers: white and yellow fleshed (Pro-vitamin A fortified) had varying proximate and energy contents. And that cassava based products are poor sources of protein and fibre, therefore is recommended that cassava products should be consumed with protein and fibre rich foods to complement this deficit.

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PE47

Dietary pattern, lifestyle and nutritional status of hypertensive patients in tertiary healthcare facility in Ekiti State, Nigeria

Dada, I. O. and Ikpeazu, E. C.
Department of Human Nutrition and Dietetics, College of Medicine and Health Sciences
Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria
lanredada2006@yahoo.com

KEYWORDS: Dietary Pattern, Lifestyle, Nutritional Status, Hypertension

BACKGROUND:
High incidence of hypertension in adult Nigerians with a prevalence of 55% (1). It is a risk factor for heart attack, stroke and kidney diseases (2). The predisposing factors include overweight/obesity, sedentary lifestyle, inadequate intake of fruits and vegetables, excess sodium and alcohol intake, and smoking (2). This study assessed dietary pattern, lifestyle and nutritional status of hypertensive patients in tertiary hospital in Ekiti State.

MATERIALS AND METHOD:
This descriptive and cross sectional study involved 148 hypertensive patients from two Teaching Hospitals in Ekiti State. Information on socio-demographic and lifestyle was obtained by questionnaire; food frequency questionnaire was used to capture dietary data. Body Mass Index (BMI) was calculated from weight and height measures and classified into underweight (<18.5), normal weight (18.5-24.9), overweight (25.0-29.9) and obesity (≥30.0). Waist-to-hip ratio of the patients was evaluated from measured waist and hip circumferences. The waist-hip-ratio was classified into safe for male (≤ 0.95) and female (≤ 0.80) and at risk for male (> 0.95) and female (> 0.80). The blood pressure readings were obtained from the patients' hospital records and classified as non-hypertensive (BP<140/90) and hypertensive (BP≥140/90). Data collected were analysed using SPSS version 20.

RESULTS AND DISCUSSION:
Patients were ≥ 60years (45.9%) and were consuming alcohol (45.9%) and carbonated drinks (67.6%). Engaging in physical activity <1h/day (56.8%) and ≤2days/week (51.4%). Almost two thirds (64.9%) took ≥3 meals/day; 51.4% took breakfast meal 5-7days/week. Considering foods consumed three or more times per week, vegetables (83.7%) and fruits (70.2%) were topmost (Table 1), butter (48.6%), fried egg (48.6%). BMI indicated that 62.1% and 13.5% were overweight/obese and underweight respectively. WHR showed that 27% males and 43.2% females were at risk. **High BP** was found in 27% of the patients. The implication of these results is that predisposing factors of hypertension were still present with the patients. This confirms previous studies in Nigeria (1,2,3) and may suggest inadequate knowledge and practice of lifestyle and dietary modifications.

Table 1: Food consumption pattern of hypertensive patients

Food	Frequency of consumption per week				
	Never N(%)	1 - 2 times N(%)	3 – 4times N(%)	5-7times N(%)	7times N(%)
Beef(including offal)	13(35.1)	13(35.1)	3(8.1)	6(16.2)	2(5.4)
Tinned and processed foods	21(56.8)	7(18.9)	4(10.8)	3(8.1)	2(5.4)
Fried egg	11(29.7)	8(21.6)	9(24.3)	3(8.1)	6(16.2)
Milk	12(32.4)	8(21.6)	4(10.8)	4(10.8)	9(24.3)
Cocoa drinks e.g. bournvita	10(27.0)	8(21.6)	5(13.5)	9(24.3)	5(13.5)
Butter/ Margarine	13(35.1)	6(16.2)	4(10.8)	9(24.3)	5(13.5)
Refined sugar (table sugar)	11(29.7)	8(21.6)	3(8.1)	9(24.3)	6(16.2)
Cereal and cereal products(rice, pap)	12(32.4)	6(16.2)	7(18.9)	8(21.6)	4(10.8)
Starchy roots and tubers and their products (e.g. Yam, Amala, etc)	6(16.2)	9(24.3)	8(21.6)	9(24.3)	5(13.5)
Legumes and legume products	11(29.7)	7(18.9)	7(18.9)	6(16.2)	6(16.2)
Fish	7(18.9)	10(27.0)	5(13.5)	5(13.5)	10(27.0)
Poultry	6(16.2)	9(24.3)	3(8.1)	7(18.9)	12(32.4)
Fruits	7(18.9)	4(10.8)	7(18.9)	8(21.6)	11(29.7)
Vegetables(green, okra)	2(5.4)	4(10.8)	9(24.3)	9(24.3)	13(35.1)

CONCLUSION AND RECOMMENDATION(S):

Intakes of alcohol and butter, low physical activity, high prevalence of overweight/obesity and high BP were observed among the patients. Nutrition education is recommended so as to enhance lifestyle and dietary modifications.

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PE48

Prevalence of Underweight, Stunting And Wasting Among Preschool Children in Rivers West Senatorial Zone, Rivers State

BOK, IBINGO SHUAIBU[1], ANOSHIRIKE, CYRIL O[1*], NGWU, E.K[1]

[1] *Department of Nutrition and Dietetics, University of Nigeria Nsukka.*

Cyril.anoshirike@unn.edu.ng

KEYWORDS: Malnutrition, Pre-school Children, Underweight, Stunting, Wasting

BACKGROUND:

Malnutrition is a global problem that is affecting millions of individuals across the ages (1)(2). It presents as under nutrition (wasting, stunting, and underweight), over-nutrition (overweight and obesity) as well as micro-nutrient deficiency In developing countries, Nigeria inclusive, undernutrition is the prevalent form of malnutrition basically caused by food insecurity. Food insecurity in Nigeria is majorly caused by human activities which include various degrees of criminality, insurgency, inappropriate government policies and programmes etc. Though the highest prevalence of malnutrition is found in Northern Nigeria (3), other regions in addition to aforementioned human activities experience natural disasters and so are prone to malnutrition. This study investigated the prevalence of underweight, stunting and wasting among preschool children in Rivers west senatorial zone, Rivers State.

MATERIALS AND METHODS:

A cross sectional study designed with a total of 418 preschool children aged 2 to 5 years; 209 males and 209 females were recruited from the households in nine local governments in West Senatorial Zone in River state using purposive, multistage and systematic sampling methods. Data used were collected were age and sex of the child from the caregiver/mother and through observation, respectively and anthropometric measurements of the preschool children's height and weight using the standard procedure of height and weight measurement of children. WHO anthro software was used to compute and analyze the anthropometric measurements into underweight, stunting, and wasting. Data were analyzed using SPSS versio23.

RESULTS AND DISCUSSION:

The show that underweight, stunting, and wasting were 10%, 15.1% and 13.8% respectively. The proportion of children that were underweight in this study was slightly higher than underweight reported in South South (11.8%) and more than four times as low in the North West Zone (48.5%). Stunted children were approximately twice and six times as low in the South south Zone (24.5%) and in North West Zone (87.5%) of Nigeria, respectively. Waisting was found to be more than twice as high in the South South Zone (4.9%) and slightly higher than that reported in the North East zone (12.4%) (3). There was a remarkable decline in the proportion of children who are underweight and stunted, except for children who are waisted that shows an increase prevalence, indicating presence of severe or moderate acute malnutrition which could be as a result of either or both poor infant and young child feeding practices or diseases and infection in children and host of other factors which could contribute to food insecurity, poverty, insurgency and inappropriate government policies and programmes in the area. The rate of malnutrition in this area is lower than that reported by UNICEF(4) that Nigeria has the second highest burden of stunted children in the world, with 32 percent under five children affected nationally and approximately 45 percent of all deaths of under-five children has been associated with malnutrition..

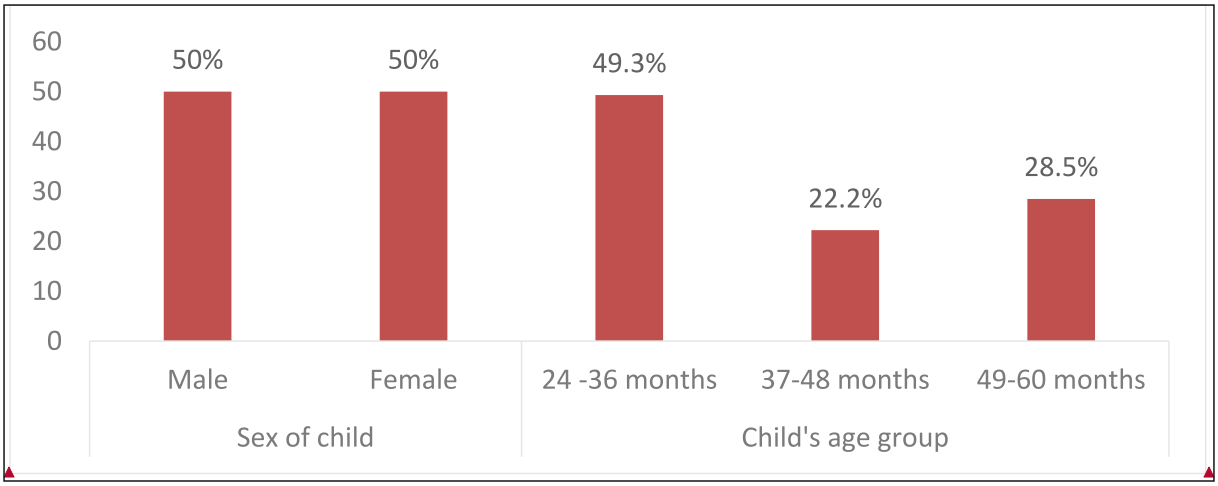

Figure 1: Distribution of sex and age group in months of pre-school children in Rivers State West Senatorial Zone

Table 1: Anthropometric indices (weight for age, height for age and weight for height) of pre-school children (24-60 months) in Rivers State West Senatorial Zone

Variables	Frequency	Percent
Weight-for-height Z-score		
Severe Overweight	19	4.7
Moderate Overweight	33	8.1
Normal	299	73.5
Moderate Waisting	26	6.4
Severe Waisting	30	7.4
Height-for-Age Z-score		
Normal	355	85.0
Moderate stunting	31	7.4
Severe stunting	32	7.7
Weight-for-Age Z-score		
Severe Overweight	7	1.7
Moderate Overweight	22	5.3
Normal	347	83.0
Moderate underweight	23	5.5
Severe underweight	19	4.5
Body Mass Index-for-Age Z-score		
Severe Overweight	23	5.5
Moderate Overweight	34	8.1
Normal	303	72.5
Moderate Waisting	23	5.5
Severe Waisting	35	8.4

CONCLUSION:
Result shows a declined in prevalence of underweight and stunting in children aged 24 to 60 months and increase in the proportion of children who are wasted in Rivers State West Senatorial Zone.. Appropriate infant and young child feeding policies, programmes and practices needs to be reinforced while resolving insurgency, conflicts and inappropriate government policies which has direct and indirect influence on manutrition in the area.

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PE49

Chemical Composition and Microbial Quality of Rice Dishes sold at High Profile Restaurants in Enugu Urban

Azubuike U.C., Maduforo A.N., Onuoha U.R., Nwamarah J.U. Chikwendu J.N., Aloysius-Maduforo M.C., Anidi C.V. Onodugo N.G., Madukwe E.U., Agbo E.C. Umeakuka O.P.,
Department of Nutrition and Dietetics, University of Nigeria, Nsukka, Enugu State, Nigeria

KEYWORDS:

BACKGROUND
Studies have shown that increasing number of persons eat outside their homes for various reasons (1-2).They patronize different eat-out facilities generally referred to as restaurants. This practice has been associated with some public health problems arising as a result of poor handling and processing of foods that are offered to patronizers or consumers. The study therefore investigated the chemical composition and microbial quality of rice dishes (jollof rice, fried rice, and white rice and stew) sold at top restaurants in Enugu urban.

MATERIALS AND METHODS:
Samples were obtained from 3 top restaurants in Enugu urban. The samples were collected twice: one weekday and one weekend for the chemical compositions while for the microbial quality, samples were obtained from five top restaurants, 2 weekdays and one weekend. The rice samples were subjected to chemical analysis and microbial quality using standard methods. Data obtained were subjected to statistical analysis using ANOVA and turkey HSD test to compare the means of group. A $p<0.05$ was considered statistically significant.

RESULTS AND DISCUSSION:

The mean moisture content of white rice and stew was comparable ($p>0.05$) to jollof rice and fried rice. The mean ash, protein, crude fibre, fats and carbohydrate contents of the rice dishes were similar ($p>0.05$). A serving portion of carbohydrate in jollof rice in restaurant 1, 2 and 3 were 55.51%, 50.16%, 96.44%, respectively. A serving portion of carbohydrate in fried rice in restaurant 1, 2 and 3 contained 56.46%, 45.25%, 53.85% respectively. The mean sodium contents were 312.00 mg/100g (jollof rice), 286.23 mg/100g (fried rice), 197.69 mg/100g (white rice and stew), the mean magnesium contents were 20.03 mg/100g (jollof rice), 12.80 mg/100g (fried rice), 18.92 mg/100g (white rice and stew. The mean carotene, vitamin E, vitamin B_1, vitamin B_2, vitamin B_3 contents of the rice dishes was not significant ($p>0.05$). Mercury content ranged from 0.02 to 0.03 μg/g, lead content ranged from 0.03 to 0.07 μg/g, arsenic content ranged from 0.01 to 0.04 μg/g and cadmium content were 0.02 μg/g in all the 3 samples from the high profile restaurants. There are several debilitating health risk of intake of heavy metals (3-8). The microbial quality showed that restaurant B and E had no microbial growth while A, C and D had microbial growth in their food samples where A had an average of 407 cfu/g of *E coli* and *proteus,* C had an average of 330 cfu/g of *E coli* and *campylobacter* and D had a n average of 123 cfu/g of E coli, *klebsula* and *campylobacter*. Microbial quality of rice dishes sold at top restaurants in Enugu urban is shown in Table 1.

Table 1: Microbial Quality of rice dishes sold at top restaurants in Enugu urban

Sample	Mac-conkey	DCA	SDA	Plate count agar
A1	*E. coli*: 150cfu/g	*Proteus*: 200cfu/g	No fungal growth	*E. coli*: 200cfu/g
A2	*E. coli*: 200cfu/g	*Proteus*: 100cfu/g	No fungal growth	*E. coli:* 220cfu/g
A3	*E. coli*: 200cfu/g	NSBG	No fungal growth	*E. coli*: 250cfu/g
B1	NSBG	NSBG	No fungal growth	NSBG
B2	NSBG	NSBG	No fungal growth	NSBG
B3	NSBG	NSBG	No fungal growth	NSBG
C1	*E. coli*: 280cfu/g	*Campylobacter:* 150cfu/g	No fungal growth	*E. coli*: 20cfu/g
C2	NSBG	NSBG	No fungal growth	NSBG
C3	*E. coli*: 350cfu/g	*Proteus*: 180cfu/g	No fungal growth	*E. coli*: 400cfu/g
D1	NSBG	NSBG	No fungal growth	NSBG
D2	*E. coli*: 120cfu/g	*Campylobacter:* 100cfu/g	No fungal growth	*E. coli*: 100cfu/g
D3	*Klebsula:* 50cfu/g	NSBG	No fungal growth	NSBG
E1	NSBG	NSBG	No fungal growth	NSBG
E2	NSBG	NSBG	No fungal growth	NSBG
E3	NSBG	NSBG	No fungal growth	NSBG

KEY: DCA: deoxycholatecitrate agar
SDA: sabourant dextrose agar
NSBG: no specific bacteria growth
Cfu/g: colony forming unit per gram
1jollof rice
2fried rice
3white rice and stew

CONCLUSION:

This study showed that rice dishes sold at top restaurants in Enugu urban contained appreciable amount of nutrients and some restaurants had microbial growth in them showing the hygienic level of their staff and environment where food are prepared and sold.

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PE53

Evaluation of Glycemic Index of Orange Fleshed Sweet Potato and Indigenous Sweet Potato (*Ipomoea Batatas*) Commonly Consumed in Abeokuta Metropolis, Ogun State, Nigeria

John E. P[1]. Oyesanya O. S[1]. and Olayiwola I. O[1]

[1]*Department of Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. ebenezerjohn15@yahoo.com*

KEYWORDS: Glycemic Index, Orange Flesh, Indigenous, Sweet Potatoes

BACKGROUND:

The advocacy of orange-fleshed sweet potato due to its beta-carotene bio-fortification and also its implications on health and some disease management makes it important to assess its glycemic index (GI). Thus, this study aimed to determine the GI of orange-fleshed sweet potato and indigenous sweet potato commonly consumed in Abeokuta Metropolis, Ogun State, Nigeria.

MATERIALS AND METHODS:

Indigenous sweet potato and orange-fleshed sweet potato were obtained from farmers market at Abeokuta, Ogun State, Nigeria. Healthy five males and five females within the age range of 18 and 24 years were recruited for this study. Each of the volunteers was served with equivalent test foods to give 50g available carbohydrate. The boiled potatoes were served plain after an 11-12hours overnight fast and the subjects were tested for blood glucose on separate time intervals. The incremental area under the curve was determined and the GI was calculated. Mean and standard deviation, and correlation were done. Criteria for significance was $p \leq 0.05$.

RESULTS AND DISCUSSION:

The mean GI of orange-fleshed sweet potato (OFSP) was 81.36 ± 7.17 while that of indigenous sweet potato was 85.50 ± 7.26. The GI of indigenous sweet potato (ISP) (85.50) was high in this study which was similar to (1) who reported 88.

Table 1:Glycemic index of orange fleshed sweet potato and indigenous sweet potato

Test Foods	Serving Size (g)	GI (Mean±SD)	GI Ranking	P- value
Orange Fleshed Sweet potato	250	81.36 ± 7.17	High	0.307
Indigenous Sweet potato	200	85.50 ± 7.26	High	

There was no significant difference between the GI mean value of orange fleshed sweet potato and indigenous sweet potato at 30, 60 and 120 minutes, while a significant difference ($p<0.05$) was observed at 90 minutes.

Table 2: Mean value of the test food at different time

Time (minutes)	Type of Food	Mean ± SD*
T1 (30 minutes)	OFSP	103.90 ± 11.96[a]
	ISP	109.90 ± 16.59[a]
	GLUCOSE	124.50 ± 10.39[b]
T2 (60 minutes)	OFSP	98.50 ± 18.95[a]
	ISP	100.10 ± 13.54[a]
	GLUCOSE	124.70 ± 4.69[b]
T3 (90 minutes)	OFSP	92.80 ± 13.36[a]
	ISP	105.60 ± 12.36[b]
	GLUCOSE	118.50 ± 5.30[c]
T4 (120 minutes)	OFSP	84.70 ± 12.43[a]
	ISP	89.90 ± 11.74[a]
	GLUCOSE	111.00 ± 7.38[b]

*Mean±SD with different superscript along the column for each time has significant difference at p≤0.05.

CONCLUSION AND RECOMMENDATION:

The orange-fleshed sweet potato and indigenous sweet potato consumed in Abeokuta Metropolis have high GI, although orange-fleshed sweet potato had lower GI compared to indigenous sweet potato. Thus, moderate consumption of sweet potato is recommended for diabetics as a result of its capacity in raising blood glucose (2).

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OE2

Boosting the Proximate Composition of *Gari* Using Cassava Peel

Ukozor, A.U.C. And Obodo, N. C.
Alvan Ikoku Federal College of Education, PMB 1033, Owerri
aukucozor@gmail.com

KEYWORDS: Boosting, Proximate Composition, *Gari*

BACKGROUND AND OBJECTIVE:
Gari is a fermented, creamy, yellow, toasted and granular cassava product, widely consumed in West and Central Africa. It is estimated that more than 75 percent of the cassava produced in Africa is processed into *gari*. Protein-energy malnutrition (PEM) remains a major public health problem in many developing countries, and there is need to increase the daily intake of protein especially from *gari*. *Gari* is known for its low protein content, therefore, enriching the cassava meal with a cheap protein source, using the fermented peel can help address PEM. The work is aimed to boost the proximate composition of *gari* using fermented cassava peel.

MATERIALS AND METHODS:
Fresh cassava tubers (TME419) were peeled and washed with clean water. It was grated, dewatered and allowed to ferment for 24hours. Also the peels were washed and soaked for three different periods (24hrs, 48hrs and 72hrs). They were similarly grated and incorporated into the fermented mash in a ratio of 30:70 (fermented peel: fermented cassava mash), and mixed thoroughly, then granulated to reduce the size. It was toasted in a hot frying pan to form the final dry and crispy product. Then, the *gari* was sieved to separate coarse particles, with a standard sieve size (0.25mm to 0.5mm). Finally, it was packaged for proximate analyses (1), residual cyanide content (2), and sensory evaluation.

RESULTS AND DISCUSSION
The result in Table 1 below that the most suitable fermentation period that improved its protein content is 24 h as indicated in FDG_1 ($2.74g100g^{-1}$),due to fermentation, which led to the possible secretion of some extra-cellular enzymes and also increases in the growth and proliferation of fungi/bacteria complexes in the form of single cell proteins.
The result on ash showed a significant ($p=0.11$) increase in FDG_1 ($1.83g100g^{-1}$) when compared with other samples, accounted for by multiplying the microorganisms in the fermentation process (3). The crude fibre contents of the experimental *gari* samples showed the greatest significant ($p\geq0.05$) increase in FDG_1 ($6.41g100g^{-1}$) which certainly was as a result of the addition of the fermented peels. (4). The highest residual hydrogen content of the experimental samples was $1.05^{o}\pm0.03g100^{-1}$.

Table 1: Proximate composition of *gari* processed with cassava peel.

Samples	Moisture	Protein	Fat	Ash	Crude fibre	Carbohydrate
FDG_1	$3.88^{a}\pm0.17$	$2.74^{a}\pm0.09$	$1.24^{a}\pm0.07$	$1.83^{a}\pm0.10$	$6.41^{a}\pm0.14$	$85.38^{ab}\pm0.53$
FDG_2	$4.02^{b}\pm0.28$	$2.56^{a}\pm0.15$	$1.81^{b}\pm0.08$	$1.48^{b}\pm0.05$	$6.18^{ab}\pm0.09$	$83.92^{b}\pm0.67$
FDG^3	$4.88^{a}\pm0.09$	$2.35^{a}\pm0.12$	$2.32^{a}\pm0.10$	$1.10^{b}\pm0.14$	$6.02^{a}\pm0.11$	$83.30^{b}\pm0.57$
SDG	$5.58^{a}\pm0.08$	$1.40^{b}\pm0.13$	$0.82^{d}\pm0.10$	$0.61^{c}\pm0.13$	$3.99^{b}\pm0.08$	$87.60^{b}\pm0.54$
LSD	0.17927	0.13008	0.09393	0.11332	0.11069	0.92771

Mean values with different letter along the same column are significantly different ($P<0.05$)

Key:FDG_1- *gari* processed with 24hr– fermented peel, FDG_2 - *gari* processed with 48hr – fermented peel, FDG_3 - *gari* processed with 72hr – fermented peel, SDG- standard *gari* (control sample)

CONCLUSION AND RECOMMENDATION:

The study revealed that processing cassava with the fermented peel significantly improved its protein, ash and crude fibre contents. The experimental samples were also acceptable. Therefore, the consumption of *gari* processed with the fermented peel is a cheap and sustainable means of increasing protein intake of the population.

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PF2

Nutrients Evaluation and Sensory Properties of Snack (Chin-Chin) made with Wheat (*Triticum Aestivum*) and Bambara Nut (Vigna *Subterranea*) Flours

[1]Otitoju GTO, [2]Otitoju O. and [1]Awunugi AF.

[1]Department of Food Science and Technology, Faculty of Agriculture and Life Sciences Federal University Wukari Taraba State.

[2]Department of Biochemistry, Faculty of Pure and Applied Sciences, Federal University Wukari Taraba State.

otitojugrace.to@gmail.com

KEYWORDS:

BACKGROUND AND OBJECTIVES

Globally, the demand for pastry products over the years has increased drastically, the demand in Nigeria, particularly in the hospitality industry. This will continue to be on the increase since the consumers of the pastry products (snacks) produced are also increasing. Therefore, the need for substitutes that will supplement the wheat flour for snacks production is of great importance. Pastry products such as cake, chin chin, among others are sold at every nooks and cranny of our society most particularly in the hospitality industry where snacks are required for fast food consumption. In as much as the demand for these pastry products increase the cost of importing the wheat flour also becomes very expensive [1]. The price of Nigerian grown wheat has risen by 33 % due to the low production volumes of the product. The rise in the cost of wheat may lead to an increase in bread and other pastries [2]. Wheat is the major raw material for flour used in baking (www.punchng.com). This study examined the proximate composition of processed Bambara nut (*Vigna Subterranea*) flour with wheat (*Triticum Aestivum*) flour blended to produce chin-chin.

MATERIALS AND METHOD

The flour were blended in the ratios of 95:5, 90:10, 85:15, 80:20, 75:25 and 100% respectively. The wheat flour (100%) served as control. The food products developed (chin chin) were chemically analyzed for nutrient composition (proximate, vitamins and minerals). A nine (9) Point Hedonic Scale was used to evaluate the products (chin chin) developed in terms of color, flavor, texture, taste and general acceptability. Statistical analysis was carried out using analysis of variance (ANOVA) and means were separated through standard deviation.

RESULTS AND DISCUSSION

The results showed that proximate composition (protein, moisture, ash, fat, crude fiber and carbohydrate) ranges from 11.72 ±0.38 to17.29 ±2.57%, 5.89±1.07 to 8.70 ±1.29%, 4.56 ±0.66 to 6.76 ±0.54%, 1.23 ±0.07 to 3.54 ±1.45%, 9.15 ±1.71 to 14.51±2.03% and 53.21 ±6.56 to 65.80 ±2.36% respectively. The minerals calcium, magnesium ranged from 2.73 ±0.27 to 4.48 ±0.21, and 0.54 ±0.05 to 0.89 ±0.04 respectively. Vitamin C content ranged from 0.86 ±0.08 to 2.16 ±0.33. These chin-chin samples were generally high in all the attributes evaluated as compared to control chin-chin in Table 1. The result showed that, they were significantly different in all the attributes measured, except for colour. General acceptability for all the blended samples showed higher rating than the control in all the attributes.

Table 1: Proximate Composition of Chin Chin made with a blend of Bambara nut and wheat flour (protein substitute) %.

Sample /nutrients per 100g	Composition 100%	Protein	Moisture	Ash	Fat	Crude fibre	Carbohydrate	Energy value (kcal)	Energy value(kJ)
WHB1	95 : 5	12.92±4.70	6.50±2.36	4.67±0.53	1.23 ±0.07	10.01±2.33	63.92 ±8.50	315.68	1320.81
WHB2	90 : 10	15.30 ±3.30	7.61 ±1.51	6.76 ±0.54	2.28 ±0.22	14.51±2.03	53.21 ±6.56	294.56	1232.44
WHB3	85 : 15	17.29 ±2.57	8.70 ±1.29	4.56 ±0.66	3.54 ±1.45	9.63 ±1.95	56.28 ±6.77	325.44	1361.64
WHB4	80 : 20	11.72 ±0.38	5.89 ±1.07	4.83 ±0.64	1.99 ±0.26	10.67 ±1.90	65.80 ±2.36	327.99	1372.31
WHB5	75 : 25	11.72 ±0.38	1.89±0.19	5.32 ±0.46	2.19 ±0.19	9.15 ±1.71	65.73 ±1.95	329.51	1378.67
WHF	100	8.42±0.88	10.65± 0.34	2.35 ±1.85	4.35 ±1.95	5.85 ±1.65	70.58±2.45	355.15	1485.95

CONCLUSION AND RECOMMENDATION

Conclusively, the results obtained from the study, indicated that wheat flour could significantly be enriched with Bambara nut flour up to 15 % level. An increase in fibre, ash and carbohydrate content were observed in the same sample of Chin-Chin, and this could nutritionally be advantageous to consumers. Therefore, we recommend that Bambara nut flour can be used as a blend of flour in pastries in order to maximize the nutritional benefits of this leguminous crop.

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OF3

Proximate Composition of Dry Sorghum Leaf Sheaths

Beleya, E. Eke-Ejiofor, Allen, J. E
Rivers State University, Port Harcourt, Rivers State, Nigeria
ebeleya@gmail.com

KEYWORDS: Proximate, Phytochemical, Sorghum Leaf Sheath

BACKGROUND:

Colour is one of the sensory properties of foods that affect consumers' acceptability of food products. There are several synthetic and natural colorants used in the food industry. Food colourants add colour to food and also mask unpleasant attributes or enhance the natural properties of food products (1). Due to some synthetic food colourants' potential adverse health effects on susceptible individuals, consumers now prefer natural colourants (2). One of this natural food colourant is the dye from sorghum (*Sorghum bicolour*) leaf sheath. Sorghum leaf sheath could be added to the food during cooking or the bright red colour could be extracted and used in cooking. The addition of sorghum leaf sheath to foods such as cereals, legumes, fermented cereal-based porridges such as ogi and fruit drinks adds colour to the food. However, sorghum leaf sheath may contain other components that could improve the nutrient content of foods as well as contribute to the health of the consumers. Much of the information available is on the colouring potentials of sorghum leaf sheath extract. Thus this study assessed the proximate composition of dry sorghum leaf sheath.

MATERIALS AND METHOD

Sorghum leaf sheaths were purchased from Rumuokoro market in Port Harcourt, Rivers State. The analysis was carried out in the Department of Food Science and Technology Laboratory, Rivers State University, Port Harcourt. Sorghum leaf sheaths were winnowed, washed slightly with water, dried in an air oven at 60°C for 6hrs and stored for analysis. The moisture, ash, fat, crude protein and crude fibre were determined as described by (3) while carbohydrate was by difference.

RESULTS AND DISCUSSION

The proximate composition of Sorghum leaf sheath presented in Table 1 showed that the sorghum leaf sheaths have a moisture content of 5.82%; this is expected as the sorghum leaf sheaths evaluated are in dry form. Ash content of the sorghum leaf sheath was 10.67% and fat 2.17%. The high ash content is an indication that sorghum leaf sheaths are valuable sources of minerals, while the low fat content implied that it is not a source of fat and would provide minimal energy. The crude protein content of the sorghum leaf sheath was 4.02% which agrees with the findings of (4) who reported protein content of 4.87% for sorghum leaf extract. Crude fibre content of sorghum leaf sheath was 51.99%, while carbohydrate was 25.33%. Sorghum leaf sheath is a good source of fibre as the level obtained in this study is higher than 3g/100g recommended for products regarded as sources of fibre (5).

Table 1: Proximate composition of sorghum leaf sheath (%)

Parameters	Content
Moisture	5.82 ± 0.02
Ash	10.67± 1.27
Fat	2.17 ± 0.00
Crude Protein	4.02 ± 0.00
Crude Fibre	51.99 ± 0.00
Carbohydrate	25.33 ±1.25

CONCLUSION AND RECOMMENDATION

The study revealed that sorghum leaf sheath is high in ash and fibre. The addition of sorghum leaf sheath to foods therefore, would add colour and enhance the nutrient content of foods. Studies should be conducted to assess the nutrient content of foods cooked with sorghum leaf sheath.

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OF6

Sensory properties and proximate composition of biscuits made from wheat (*triticum aestivum)* and mahogany bean seed (*afzelia africana*) composite flour.

Egwuatu D.O., Onyechi, U.A. & Nsofor L.D.
Department of Nutrition and Dietetics, University of Nigeria, Nsukka
laura.nsofor@unn.edu.ng

KEYWORDS: Mahogany bean seed, Proximate, Sensory properties

BACKGROUND AND OBJECTIVES:
Mahogany bean seed is an underutilized legume plant (1) whose potentials has not been fully harnessed by nutritionists (2). This study evaluated the proximate composition and sensory properties of biscuits made from wheat (*Triticum aestivum)* and mahogany bean seed (*Afzelia Africana*) composite flour.

MATERIALS AND METHOD:
The study utilized an experimental design. Mahogany bean seeds were purchased from Orie Orba market in Udenu Local Government Area of Enugu State, Nigeria. All other ingredients which include eggs, wheat flour, margarine and baking powder were purchased from Ogige Main Market in Nsukka Local Government Area of Enugu State. The seeds were sorted, roasted, dehulled, fermented for 48hours (water was changed every 3hours), oven dried at 60°c for 40hours and milled into flour. The composite flour blends used for the biscuit production were formulated on weight basis of wheat-mahogany bean seed ratio: 100:0; 90:10; 80:20; 70:30 and 60:40. Thirty judges were used to assess the sensory properties of the biscuits using the nine-point hedonic scale. The products were also subjected to proximate analysis using standard procedures. Data collected was analysed using the IBM SPSS Statistics version 21. Descriptive statistics such as mean and standard deviation were used to present the results.

RESULTS AND DISCUSSION:
The sensory score of the biscuit products ranged from 4.96-7.76 for colour, 5.03-7.30 for flavour, 4.70-7.20 for taste, 5.16-6.90 for texture and 3.70-7.10 for general acceptability. Sample MDE (100:0) and sample SDA (90:0) scored above 5 points in all the sensory attributes on the nine-point hedonic scale. The proximate analysis of the biscuit samples was protein (12.34-19.87%), fat (1.00-3.00%), crude fibre (0.70-8.06%), moisture (4.36-6.89%), ash (1.96-3.60%) and carbohydrate (61.22-75.24%). Sample CME (80:20) and sample UME (70:30) had the highest fat content (3.00%) while sample MDE had the highest carbohydrate (75.24%) and ash content (3.60%). Sample DKE had the highest protein (19.87%) and crude fibre content (8.06%). The results showed that as the quantity of mahogany bean seed flour increased, the protein composition of the products also increased. This could be because mahogany bean seed is a good source of protein (3).

Table 1: Sensory properties of biscuits made from wheat and mahogany bean seed composite flour

Sample	Colour	Flavour	Taste	Texture	General acceptability
MDE	7.76 ± 1.27^{c}	7.30 ± 1.62^{b}	7.20 ± 1.82^{c}	6.90 ± 1.53^{c}	7.10 ± 1.84^{c}
SDA	6.50 ± 1.77^{b}	6.53 ± 1.43^{b}	5.93 ± 1.77^{b}	6.43 ± 1.45^{bc}	5.73 ± 1.77^{b}
CME	5.70 ± 2.10^{ab}	5.46 ± 2.14^{a}	5.33 ± 2.32^{ab}	5.86 ± 1.54^{a}	4.60 ± 2.34^{a}
UME	5.13 ± 2.14^{b}	5.03 ± 2.10^{a}	5.00 ± 2.10^{a}	5.20 ± 2.18^{a}	4.13 ± 2.25^{a}
DKE	4.96 ± 2.00^{a}	5.06 ± 1.89^{a}	4.70 ± 2.07^{a}	5.16 ± 1.96^{a}	3.70 ± 1.80^{a}

Values are mean ± S.D. Mean value with different superscript (column) is significant at $p < 0.05$

KEYS:

Sample MDE: Biscuits containing 100% wheat flour (control)
Sample SDA: Biscuits containing 90% wheat flour + 10% mahogany bean seed flour
Sample CME: Biscuits containing 80% wheat flour + 20% mahogany bean seed flour
Sample UME: Biscuits containing 70% wheat flour + 30% mahogany bean seed flour
Sample DKE: Biscuits containing 60% wheat flour + 40% mahogany bean seed flour

CONCLUSION AND RECOMMENDATION: The addition of mahogany bean seed flour to the wheat flour decreased the acceptability and increased the protein content of the biscuits. More studies aimed at improving the sensory properties of these biscuits are therefore recommended.

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OF7

Positive Nutrient Inclusion in Choices Multi-level Criteria – A case study of Nigeria

Owolawi, M.A
Choices International Foundation
maooluwa@gmail.com

KEYWORDS: Positive nutrients, Multi-level criteria, Nutrient profile, Nigeria.

BACKGROUND AND OBJECTIVES:
Nutrient profiling is described as the science of classifying or ranking foods according to their nutritional composition with the aim to fight/prevent disease and thus, promote health.[1] The Choices criteria form a global standard for healthier food and are developed to be used as a tool to improve a population's diet, and such tool is referred to as multi-level criteria (MLC) model.[2]
However, increased intake of saturated fatty acids, trans fat, sodium and sugar, with no strategy to exclude them in daily diets, had led to incidence of double burden malnutrition especially in Low- and Middle-Income Countries (LMICs). There is need for urgent strategy to combat both hidden hunger and non-communicable diseases (NCDs). Thus, the overall objective of this study was to incorporate positive nutrients in the already existing Choices MLC.

MATERIALS AND METHOD:
To achieve the stated objective, a review of pilot countries (Ghana, Zambia and Malaysia) was done to consider notable positive nutrients that are relevant for inclusion and the process of selecting the criteria for these nutrients. The dietary gap in Nigeria was also evaluated by looking at relevant studies and surveys in the country, the National Home-Grown School Feeding (NHGSF) program was also used as a guide in identifying and selecting positive nutrients. The positive nutrients (Vit A, Iron, Zinc, Calcium, Folate, Vit B6, Vit C, Vit B1, Vit B2, Vit D, Vit E, Vit B12) and criteria selected were subjected to validation by using indicator foods to perform a reality check. The criteria were selected by working closely with the fortification and regulatory policy of the country.

RESULTS AND DISCUSSION:
The positive nutrient criteria were set at having a minimum of two positive nutrients at either 5% or 15% level of the Recommended Dietary Allowance (RDA). Upon validation of the criteria using the indicator foods, the product groups show major compliance with the criteria and ranked as healthy either at Level 1 or Level 2, meeting 15% and 5% level of RDA respectively. In combination with the MLC, the criteria proved to be stricter as not all product groups satisfied the criteria for both positive nutrients and MLC. The result of the validation (Table 1) shows that the proposed criteria is in tune with the reality of food products available in the country and line with the fortification and regulation policy of the country.

Choices Product Group	Product	Expert judgment	Choices-Score	Healthiness levels	Gap assessment
	Dried Vegetables (Ugu leaves {Fluted Pumpkin})	Healthy	1	Healthy	Agreement
Processed and dried vegetables	Canned Tomato Paste	Healthy	1	Healthy	Agreement
Processed and dried fruits	Avocado	Healthy	1	Healthy	Agreement
	Frisan Coconut Chips	Unhealthy	3	Unhealthy	Agreement
	Dried Dates	Unhealthy	1	Healthy	No Agreement
Processed and dried beans and legumes	Soya beans (Cheese curd)	Healthy	1	Healthy	Agreement
	Baked beans	Unhealthy	1	Healthy	No Agreement
	Heinz baked beans	Unhealthy	2	Healthy	No Agreement
Processed and unprocessed nuts and seeds	Bambara nuts	Healthy	1	Healthy	Agreement
	Sesame seeds	Healthy	1	Healthy	Agreement
	Groundnuts (peanuts)	Unhealthy	3	Unhealthy	Agreement
	Yam flour (elubo)	Healthy	2	Healthy	Agreement
Processed tubers used as a staple	Processed cassava (fufu)	Unhealthy	2	Healthy	No Agreement
	Processed cassava (white elubo)	Unhealthy	1	Healthy	No Agreement
	Whole grained rice	Healthy	1	Healthy	Agreement
	Whole wheat	Healthy	1	Healthy	Agreement
	Maize	Healthy	1	Healthy	Agreement
Grains	Refined wheat flour	Unhealthy	1	Healthy	No Agreement
	Refined rice	Unhealthy	1	Healthy	No Agreement
Unprocessed meat and poultry	Lean meat, beef	Healthy	1	Healthy	Agreement
	Skinned chicken	Healthy	1	Healthy	Agreement
	Liver (Cow)	Unhealthy	1	Healthy	No Agreement
	Kidney (cow)	Unhealthy	1	Healthy	No Agreement
Processed meat and poultry	Sausage	Unhealthy	1	Healthy	No Agreement
	Corned beef	Unhealthy	1	Healthy	No Agreement
	Packaged shrimps	Healthy	1	Healthy	Agreement
	Dried Crayfish	Healthy	1	Healthy	Agreement
Processed seafood	Snail	Healthy	1	Healthy	Agreement
	Laser sardine	Unhealthy	2	Healthy	No Agreement
	Micra Mackerel	Unhealthy	3	Unhealthy	Agreement
	Skim milk	Healthy	1	Healthy	Agreement
	Low-fat Yoghurt	Healthy	1	Healthy	Agreement
Milk (-products)	Full Cream evaporated milk	Unhealthy	1	Healthy	No Agreement
	Butter	Unhealthy	1	Healthy	No Agreement
Cheese	Low fat cheese	Healthy	1	Healthy	Agreement
	Laughing cow cheese spreads	Healthy	1	Healthy	Agreement
Oils, fats and fat-containing spreads	Soybean oil	Healthy	1	Healthy	Agreement
	Sunflower oil	Healthy	1	Healthy	Agreement
	Palm oil	Unhealthy	1	Healthy	No Agreement
	Coconut oil	Unhealthy	1	Healthy	No Agreement
Sandwiches and rolls	M and J chicken samosa	Unhealthy	2	Healthy	No Agreement
Soups	Vegetable soup	Healthy	1	Healthy	Agreement

CONCLUSION AND RECOMMENDATION

This study was able to highlight the major nutrients that are required to be promoted for consumption in Nigeria. The positive nutrients were assigned set criteria based on their product group and show a working step in tackling DBM using the nutrient profiling model as a framework. The criteria with the inclusion of the positive nutrients fit well into the international Choices framework and can be easily used when it comes to national adaptability. To carry out any other national adaptation, there is need to check out the positive nutrients in line with the dietary gap in such country and national guidelines. Depending on each country's context, nutrients might be added to the list or removed.

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