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HARNESSING AND IMPROVING THE NUTRIENT CONTENTS OF EEPA (*LEFT OVER POUNDED YAM*) AS A WAY OF TACKLING MALNUTRITION AMONG SCHOOL AGED CHILDREN IN IFELODUN LOCAL GOVERNMENT AREA OF KWARA STATE, NIGERIA

Abubakar, H. N.[1]
Ololade, R. O.[2]
Olawepo, T. F.[3+]

[1,2]*Department of Home Economics Education, Kwara State College of Education, Ilorin, Nigeria.*
[1]*Email: hajoabu@gmail.com*
[2]*Email: wumiabike1961@gmail.com*
[3]*Department of Agricultural Science Education, Kwara State College of Education, Ilorin, Nigeria.*
Email: taiyeolawepo2012@gmail.com Tel: +2348055827136

(+ Corresponding author)

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ABSTRACT

Access to an adequate diet is a key criterion for tackling malnutrition in school aged children. The aim of the study was to improve locally produced eepa as a way of tackling malnutrition among school aged children in Ifelodun local government area of Kwara State, Nigeria. The research designs used were survey method and complete randomized design. Purposive random sampling was used to select three communities from the study area. The study was conducted with a sample of 30 mothers and 300 school aged children from the three communities selected. Collection of data from pupils was obtained through a designed interview tool and questionnaire was given to mothers. The eepa diets were sent to the laboratory to determine the proximate, mineral composition and vitamin content of the eepa diets using AOAC 2019. All descriptive statistical analyses were performed with SPSS, version 12.0 for Windows while the laboratory data were subjected to analysis of variance (ANOVA) and means separated with Duncan Multiple Range Test (DMRT) using SAS. The results show that the locally produced diets had the highest percentage carbohydrate (35.60%) and caloric value (819.58kj/100). However three improved diets of eepa had the higher percentage ash, percentage lipids, percentage crude protein and percentage crude fibre, Ca, Mg, P, K, Na, vitamin B1, B2 B3 and vitamin C than the locally produced eepa. The new improved eepa diets were eepa- beans, eepa-locust beans + mushroom and eepa-fish. These three new improved eepa diets are more nutritious than the locally produced eepa.

Contribution/Originality: The development of three new eepa diets from the locally produced one will add to number of food eaten by school aged children in Ifelodun local government area of Kwara State. The foods will economically friendly to mothers. The foods produced were more nutritious than the locally produced eepa diets.

1. INTRODUCTION

Traditional foods are staple food sources for many rural communities in the world Rankoana [1]. Bhaskarachary, et al. [2] described traditional foods as food that people have eaten for ages. These are foods with beneficial properties due to genuineness, local production and minimal or no industrial processing. Many rural communities produce and consume traditional food in the past to accomplish food security and improve nutrition. Indigenous people of rural Nigeria had long relied on traditional foods as part of their diet due to their nutritional, cultural, and economic importance. Steiner and Neathway [3]. There has been a change from this traditional food

because of civilization as most of these diets have either been forgetting or are not fed to the children again. These have resulted into change in diet by most of the rural populace. The advent of modern technology brought about processing of agricultural products in diverse forms resulting into western foods flooding the world market. This consequently affected the dietary pattern. The paradox shift from traditional foods to western dishes gradually took a toll on the food habit and the health of man because of their frequent consumption of processed foods characterized with high calories, additives, colourants, and preservatives which are detrimental to human health. Popkin, et al. [4]. This nutrition transition has resulted to health problem such as overweight, obesity and many other nutritional problems prevalent among children and adult. Colby [5] added that processed food contains dietary phosphorus which is widely utilized as food additive, evidence suggests that when in diets, may increase risks of cardiovascular and bone diseases.

Traditional foods serve as a symbol of heritage, trademark and cultural identity besides offering vital opportunity to diversify the food base [6]. These foods are important features to many cultural identities of diverse ethnic groups [7]. It is therefore important to preserve diverse food practices as a way of tackling food security and malnutrition especially in the elements of food preparation and consumption. There is significant risk that the knowledge around traditional food is being eroded along with the potential and crucial ways of living a more sustainably livelihood [8]. Many examples have been reported where communities have lost their food sovereignty, losing the right to determine their own food system and its management which has led to food insecurity and malnutrition [9]. This is evident in other developing countries like Mexico, where agrarian communities have encountered numerous influences that have caused a transition from self-reliance to a dependence on the industrial food chains [10].

Scholars argue that although traditional food have in the past played important roles in the diet of African communities, the industrialization of food and formalization of markets in many countries like Nigeria have resulted in a decrease in the use of established domesticated traditional foods that had been stable food for decades Wooten [11]. Balinga [12] elaborates further stating that traditional foods have been marginalized, owing to the lack of information on the extent of their use and importance in rural economies, their economic value, reliable methods for measuring their contribution to farm households and the rural economy, lack of world markets (except for a handful of products), irregularities in supply, quality standards, storage and processing technology.

Despite the availability of ingredients to prepare traditional foods in many rural communities, consumption frequency in rural areas is currently low and declining [13]. Many factors have been reported to affect the consumption of traditional food among which are sources of food in children's diet may vary from one society to another, Guerrero Lara, et al. [14] inadequate information on the nutritional value of traditional food and expansion of their use to conform with modern diets. Furthermore, the availability of the ingredients and their preparation as well as nutritious knowledge of the traditional foods is possible barriers to a healthy diet [15]. The inadequate knowledge of the nutritional benefits of traditional foods and the growing disinterest of the younger generation may also contribute to these foods being underutilized as staple food [16]. In addition, the collapse of knowledge on preparation and conservation skills contributes to underutilization of traditional food by mothers to give healthy diets. Kansiime, et al. [17].

Food insecurity continues to put children in a vulnerable state of poor nutritional outcomes due to inadequate diets [18]. Improving food security and improving nutrition is in the heart of the Sustainable Development Goals (SGDs) of Food and Agriculture Organization [19]. Malnutrition in children remains a global health problem in developing countries including Nigeria. It refers to a group of pathological disorders resulting from an imbalance between the intake of essential nutrients and the body's requirement for these nutrients [20]. Malnutrition has profound negative consequences for children's health and survival. The 2013 Nigeria Demographic Health Survey (NDHS) reported 37%, 29% and 18% as national prevalence rates for stunting, underweight and wasting, respectively [20].

Eepa is left over pounded yam diet traditional food prepared and given to school aged children without considering their nutritional status. Eepa preparation starts by boiling yam in water until soft for eaten. The boiled yam is pounded in the mortal using a pistil. The pounded yam is eaten with different type of soups. The left over pounded yam is then sun dried. After drying, the pounded yam is grinded into powder which is then store and later use in the preparation of eepa. Eepa is prepared by boiling one kilogramme of dried leftover yam in litre of water. Palm oil, pepper and salt are added to taste. It contains mainly carbohydrate due to the fact that the main component in its preparation is yam. However, school aged children require a lot of energy for the day today activities especially when going to school but they also require other nutrients that is necessary for their growth and mental developments. These are either lacking or inadequate when preparing eepa locally, due to inadequate knowledge of nutrition by mothers and poverty. Hence, there is a need to carry out research which focused on the preparation of eepa using locally available ingredients and flavours so as to reduce the cost of production and improve the nutrient status of the food in Ifelodun local government area of Kwara State as a way of tackling malnutrition among school aged children in the study area.

2. MATERIALS AND METHODS

The research design used was survey methods. The population of the study was all the school aged children and mothers in Ifelodun Local Government Area of Kwara State, Nigeria. Purposive random sampling based on one town per district was used to select three communities from the study area. The communities selected were Ganmo, Idofia and Igbaja. The communities selected grow yam on their farms to provide dietary requirement for their food intake and also sell these yams in the market to earn income.

A preliminary study was conducted by inviting the mothers from the study area who has knowledge of preparation of eepa locally to prepare it in the new Home Economics Laboratory of Kwara State College of Education, Ilorin. Twenty respondents were selected from the academic community to serve as critics to the local diets prepared. Questionnaire was used to gather information on the taste, flavour, appearance, affordability and awareness of the locally prepared eepa diets and the diet was sent to the laboratory for the proximate and mineral element composition to the determine the nutrient status of the diets. The proximate and mineral compositions were done using AOAC 2019 method.

Community-based participatory research (CBPR) approach was used to develop three diets from eepa. This involved visiting the three communities on market day to get the list of ready available ingredients sold in the market that can be used in the preparation of improved eepa. This is used to develop a market list. The study was conducted with a sample of 30 mothers and 300 school aged children from the three communities selected. The Local Government Education Authority (LGEA) primary school pupils in the three communities were used as school aged children while the Home Economic Laboratory in the Local Government Education Authority (LGEA) primary school were used to prepared the three improved eepa diets in the presence of the mothers selected for the study. The improved eepa were done by adding 300g of bean, 300g and 200g of mushroom and locust beans and 200g of fish to the ingredients of the locally produce eepa to develop eepa-bean, eepa-(mushroom + locust bean) and eepa- fish respectively. Collection of qualitative and quantitative data from pupils was obtained through a designed interview tool and questionnaire was given to mothers to elicit information on the three improved diets prepared by the researchers. The questionnaire addressed the socio demographic characteristics of mothers (age, family income and level of education) in section A while section B gathered information on the improved diets from the mothers. The questionnaires used were subjected to scrutiny by board of CREDITII who also gave the ethical clearance to conduct the research and administer the questionnaires.

The researchers employed a sequential explanatory mixed-method design for data collection. The questionnaire was given directly to mothers that participated in the research and interview was used to collect information from the pupils.

After the preparation of the three improved diets of eepa, the food samples were sent to the laboratory to determine the proximate and mineral composition of the improved eepa diets. The proximate and mineral composition were done using AOAC 2019.

All descriptive statistical analyses were performed with SPSS, version 12.0 for Windows while the laboratory data were subjected to analysis of variance (ANOVA) and means separated with Duncan Multiple Range Test (DMRT) at 0.05 using SAS.

3. RESULTS

3.1. Socio-Demographic Data of Respondents

The age ranges of participating mothers were between twenty one and fifty years. The majority of the participants were aged between 21-30 (50.0%) and 31-40 (40.0%). The study indicated that majority of the mothers were traders (80.0%) while 20.0% collect monthly salary as family means of survival. The study further revealed that only 16.7% of the parents had tertiary, primary and no formal education with 50.0% of them having secondary education. The demographic characteristics of the participating mothers are presented in the Table 1.

Table 1. Demographic characteristics of the study participants.

S/No		Category	Frequency	Total %
1.	Age	21-30	15	50.0
		31-40	12	40.0
		41-50	3	10.0
2.	Family income	Traders	6	20.0
		Monthly salary	24	80.0
3.	Parental Education	No formal education	5	16.7
		Primary	5	16.7
		Secondary	15	50.0
		Tertiary	5	16.7

3.2. Four Eepa Diets and their Nutritional Values

Market list was used to get the list of readily available ingredients in the market that can be used in the preparation of improved eepa. Out of a total of fifteen ingredients identified, only four ingredients were selected to prepare the three improved diets of eepa. The ingredients were selected base on their availability, cost and nutrient content. The four ingredients selected to improve eepa were beans, locust beans, mushroom and dry fish. The three diets developed were eepa-beans, eepa- locust beans + mushroom and eepa –fish.

Table 2 show the proximate analysis of the four diets of eepa. The result shows a significant difference in the proximate analysis. The results show that the locally produced diets had the highest percentage carbohydrate and caloric value while the eepa-locust beans + Mushroom had the least percentage carbohydrate and caloric value. However eepa-locust beans + Mushroom had the highest percentage ash, percentage lipids, percentage crude protein and percentage crude fibre with the locally produced eepa having the least ash, crude protein, crude fibre and moisture content.

Table 3 shows the mineral composition of the four eepa diets. The results also show a significant difference in the mineral composition of the four eepa diets. The eepa- locust beans + mushroom had the highest Ca, Mg, P, K and Na with the locally produced eepa having the least values for these entire mineral nutrients.

The Table 4 recorded the vitamin content of the four eepa diets. The result of the vitamin content was significant with the eepa- locust beans + mushroom having the highest amount of vitamin B1, B2 B3 and vitamin C and the lowest value of vitamins were recorded in the locally produced eepa.

Table 2. Proximate analysis (%) in eepa diets.

Eepa diets	Moisture	Ash	Carbohydrate	Caloric Value	Lipid	Crude protein	Crude Fibre
	%	%	%	Kj/100	%	%	%
Eepa	53.47^{c}	1.40^{bc}	35.60^{a}	819.58^{a}	4.04^{b}	2.60^{d}	1.11^{d}
Eepa- bean	60.49^{b}	1.32^{bc}	30.51^{b}	661.83^{d}	2.50^{c}	3.49^{b}	1.70^{c}
Eepa- locust beans + mushroom	60.49^{b}	1.64^{a}	23.21^{d}	686.26^{c}	6.38^{a}	4.37^{a}	4.81^{a}
Eepa- fish	61.65^{a}	1.43^{bc}	25.33c	713.69^{b}	6.56^{a}	3.53^{b}	2.46^{b}

Note: Means with the same superscript letters along the column are not significantly different from each other at P ≤ 0.05 using DMRT.

Table 3. Mineral composition (mg/100g) in eepa diets in.

	Ca	Mg	P	K	Na
Eepa	0.02^{d}	0.11^{d}	0.12^{d}	1.22^{d}	0.41^{d}
Eepa bean	0.16^{c}	0.21^{c}	0.32^{c}	1.42^{c}	0.61^{c}
Eepa- locust beans + mushroom	2.90^{a}	8.60^{a}	82.60^{a}	30.50^{a}	4.80^{a}
Eepa fish	0.37^{a}	0.41^{b}	0.62^{b}	4.42^{b}	1.31^{b}

Note: Means with the same superscript letters along the column are not significantly different from each other at P ≤ 0.05 using DMRT.

Table 4. Vitamin composition (mg/100g) in eepa diets.

	Vit. B1	Vit. B2	Vit. B3	Vit. C
Eepa	0.01^{c}	0.02^{c}	0.01^{c}	0.01^{c}
Eepa-bean	0.06^{b}	0.06^{b}	0.04^{b}	0.02^{b}
Eepa- locust beans + mushroom	2.01^{a}	1.47^{a}	1.10^{a}	1.70^{a}
Eepa-fish	0.08^{b}	0.08^{b}	0.05^{b}	0.01^{b}

Note: Means with the same superscript letters along the column are not significantly different from each other at P ≤ 0.05 using DMRT.

3.3. Feeding of the Improved Eepa Diets

The improved eepa diets were fed to three hundred primary school pupils in Ganmo, Idiofia and Igbaja towns all in Ifelodun local government area of Kwara State during break time. The diets were welcomed by both mothers and children, who agreed the diets are comparable to the modern day food.

4. DISCUSSION

This study represents the results of three developed improved diets of eepa for children consumption, in line with food sources available in the study area. Nepfumbada, et al. [21] believed it suitable to address poor eating habits by developing suitable and acceptable food for consumption for children. Mothers expressed the need to consider preparation, quality and the feeding practices during the diet implementation. In our study, mothers perceived using an eepa diet as a strategy to addressing the food security and solving malnutrition problem among children. This finding is backed by a report on traditional food and their contribution to nutritional requirements, which states that traditional food plays a significant role in enhancing quality diets [16].

The participating mothers comprised of different age groups, family income and different education background with different perceptions regarding the suitability and acceptability of eepa diets. Mothers were involved in the planning process because this could promote the use of eepa at home.

The locally produced eepa diets had the highest value for percentage carbohydrate and energy than the three improved diets. This is expected as locally produced eepa is mainly left over pounded yam and palm oil which is mainly carbohydrate and lipids

The three improved diets of eepa had more of crude protein, crude fiber, ash, moisture content and lipid than the locally produced eepa diets. However the eepa with the combination of locust bean and mushroom had the highest of value of crude protein, crude fiber, ash, moisture content and lipid. The high amount of the crude protein, crude fiber, ash, moisture content and lipid recorded in the eepa with the combination of locust bean and mushroom is as a result of the inclusion of locust bean [22] and mushroom. Manjunathan, et al. [23] Similar results were

obtained for the mineral and vitamin contents of eepa. The improved diets have more of mineral and vitamin content than the locally produced eepa diets. As recorded in the proximate analysis, the eepa diets with combination of locust beans and mushroom had value of mineral and vitamin composition. Uwaegbute and Nwamarah [24] reported that locust beans had high value of protein (37.34%), crude fiber (24.21%) and moisture content (42.80%). Manjunathan, et al. [23] reported in mushroom had Ash (6.87%), crude protein (37%), crude fiber (21.97%), lipid (0.74%), Na (858.4mg/100g), K (588.4 mg/100g), Ca (607 mg/100g), Mg (136 mg/100g) and Fe (16.3 mg/100g).

5. CONCLUSION

Three new improved eepa diets are hereby proposed. These are eepa- beans, eepa-locust beans + mushroom and eepa-fish. These three new improved eepa diets are more nutritious than the locally produced eepa. It was concluded that eepa-locust beans + mushroom had the highest value for crude protein, crude fiber, ash, moisture content, lipid and vitamin content .than the other two eepa. However the locally produced eepa had the highest carbohydrate and caloric value than the improved eepa.

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