



ASSESSMENT OF FOOD TYPES AND THEIR NUTRITIONAL VALUES AMONG FEMALE FARMING HOUSEHOLDS IN BAUCHI STATE.

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ABSTRACT

In order to ensure adequate food production by female farmers to feed the teeming population of Nigeria; challenges and constraints which hamper women's effectiveness must be promptly addressed. The present study aimed to assess food types and their nutritional values among female farming households in selected Local Government Areas of Bauchi state. A cross-sectional descriptive survey was carried out to document the commonly produced, highly acceptable formulations and consumed food types by the female farming communities. Three hundred and one (301) questionnaires were administered to female farmers in Bauchi State. Multistage sampling technique was employed, where the respondents were stratified into three senatorial districts; one local government was picked from each stratum. Nutritional values analysis was carried out using standard procedure. The data were analyzed using Statistical Package for Social Science (SPSS) version 21.0 to analyze the data. A large majority (90.7%) of the respondents are married while the remaining percentage is single mothers, divorced and widowed. Majority (72.8%) of the respondents earned less than ₦10,000 monthly. A mean

ranging from 0.5 – 1.0 revealed that the respondents consumed at least one from all the various groups of foods. Based on the laboratory analysis, the increase in nutrient contents of cookies as observed in the proximate analysis of sample TBR (cooked) due to its enrichment by soybeans, which is adequately rich in protein, 12.95 g of protein per 100g. Sample TBC (cooked) showed relatively increase in mineral contents and was higher in sodium (10.17 ± 0.203^a), calcium (5.24 ± 0.104^a), magnesium (8.22 ± 0.164^a), zinc (6.22 ± 0.03^b) and iron (9.81 ± 0.14^b) contents than sample GPC. It was concluded that low income and environmental factors affects the food choices of female farming household as well as hygiene practice of the women. The prevalence of malnutrition especially among their children is significantly high. There is need to organize nutritional awareness among the females in the study area in order to encourage eating meals with plenty of fruits and vegetables

Keywords: Food types, nutritional values, female farming households

INTRODUCTION

An overwhelming majority of women in rural and urban are associated directly or indirectly with agricultural production, processing and distribution. About two third of the manual labour in farming is constituted by rural women. Irrespective of their degree of affluence, they provide 14 to 10 hours of productive physical labour every day in a wide variety of activities directly connected with agriculture, allied and domestic chores (Manjusuman, 2019). The population of Nigeria is growing rapidly. This has made food supply to be grossly inadequate to feed the growing population leading to malnutrition, increased rates of morbidity and mortality among the vulnerable groups-infants, toddlers and pre-school children. Malapit and Quisumbing (2016) found that rural Nigerian women play an important role in food production and nutrition of their families with the women providing up to 80% of the food crops but the United Nations Development Programme (2016) has found that these rural women faced much constraints. To overcome these problems

daily diet of the women should be nutritious. But health is the crucial area where no due attention has been paid for women. Nutritional surveys indicate large gaps in nutritional requirements and consumption among females as compared to males, which majority of rural and tribal women suffer from anaemia which leads to low birth weight among babies. However, health is fundamental to human progress because women's health status affects their productivity and there by their roles in society and their own development. Nutrition is closely interlinked with health and low nutritional status of women makes them more prone to several diseases. This is because they have to bear and rare children. (Hoddinott, 2012). In order to ensure adequate food production by female farmers to feed the teeming population of Nigeria; challenges and constraints which hamper women's effectiveness must be promptly addressed and adequate measures that serve as solutions must be vigorously sought and implemented. In several parts of the developing world, complementary feeding continues as a challenge to good nutrition in children of 6–23 months (United Nations Children's Fund (UNICEF) 2014). In Nigeria, only 21% of breastfed children receive the minimum acceptable complementary feeding diet (NPHCDA, 2012). However, in Ethiopia, only 4.2% of breastfed children of 6–23 months of age have a minimum acceptable diet (WHO, 2019). The challenges during complementary feeding are context specific, but many are common across settings. They are often characterized by poor feeding practices and poor dietary quality of homemade complementary foods (WHO, 2020). Poor feeding practices are characterized by poor timing of complementary foods introduction (too early or too late); infrequent feeding; and poor feeding methods, hygiene, and child-care practices (Multiple Indicator Cluster Survey-3 MICS, 2011). In view of this, the present study aimed to assess food types and their nutritional values among female farming households in selected Local Government Areas of Bauchi state

METHODOLOGY

Study Design

A cross-sectional descriptive survey was carried out to document the commonly produced, highly acceptable formulations and consumed food types by the female farming communities and standardization of the complementary foods was done by identifying through focus group discussion and weighing all the ingredients, with their nutritional values profiles analysed in the laboratory.

Description of Study Area

The study was carried out in Bauchi state. Bauchi State is one of Nigeria's thirty six (36) political administrative states. It is one of the 19 loosely referred to as the northern states and one of the 8 often referred to as the far-northern states in the country. It was created as a state in 1976. The present Bauchi State is made up of 20 Local Government Areas; the state is located in the north-eastern part of Nigeria between latitudes 9° 3' and 12° 3' north of the equator and 8° 50' and 11° east of the Greenwich Meridian and covers 45,837 square kilometres (National Population Commission, 2006).

Study Population

The target population for this study was female farming households in the study areas.

Sample Size

The formula developed by Daniel, (1999) was used to calculate the sample size.

$$n = \frac{Z^2 P (1-P)}{d^2}$$

Where n = required sample size

Z = value of confidence (standard value 1.96)

P = prevalence of farmers in Katagum is 26% (26/100 = 0.26)

d = precision of margin error (5/100 = 0.05) = 5%

$$n = \frac{Z^2 \times P (1-P)}{d^2}$$

$$\begin{aligned}n &= \frac{(1.96)^2 \times 0.26 (1 - 0.26)}{(0.05)^2} \\&= \frac{3.8416 \times 0.266 \times 0.734}{0.0025} \\&= \frac{0.7500493504}{0.0025}\end{aligned}$$

$$n = 301$$

Thus, 301 questionnaires were administered to female farmers in Local Government Areas of Bauchi State.

Sampling Procedure

The sampling technique employed in carrying out this research was multistage sampling technique where the respondents were stratified into three senatorial districts; one local government was picked from each stratum. 301 respondents were randomly selected to represent the entire population of female farmers in the study areas, were then clustered into groups. Based on the responses observed after the administration of the survey questionnaires and focus group discussion, the most commonly prepared, highly acceptable formulations and consumed by the children were selected for standardization and then prepared for laboratory analysis to determine the nutritional values.

Instrument for Data Collection

The instrument used in collecting the data included a structured questionnaire, weighing scale and heightometer, MUAC tape, measuring cups and plates.

Procedure for Data Collection

Structured questionnaire was administered to the respondents by the researchers through personal contacts and with the help of four research assistants. The research assistants were trained by the researchers on the purposes of the study and the procedures in administering and collection

of the instruments so as to ensure proper administration, safe-handling and return of the instrument.

Sample Collection

All the major ingredients used were bought from central markets of respective senatorial districts

Standardized Complementary foods

All the ingredients used for the complementary foods recipe were standardized by weighing the items on a balance scale and added water was measured using measuring cup. Weighting scale was used to determine cooking materials and its contents. Modified National Food Service management Institution (NFSMI) method (2010) was used to standardize recipes collected which includes the following steps: Recipe verification, Product evaluation and Quantity adjustment.

Nutritional Values Analysis

Proximate Analysis

Proximate analysis was carried out using AOAC methods (2000) to determine moisture, ash, protein, crude fibre, fats and total carbohydrate was calculated.

Mineral and Vitamin Analyses

Mineral analysis was carried out using Atomic Absorption Spectrophotometer while vitamin analysis was done using High Performance Liquid Chromatography

Statistical Analysis

The data were analyzed using Statistical Package for Social Science (SPSS) version 21.0 to analyze the data. Descriptive statistics such as frequencies, percentages were used to determine socio-demographic characteristic and food types and inferential statistics such as ANOVA

and Duncan Multiple Range Test to determine means separation. Level of significance was set at $P < 0.05$.

Ethical Consideration

The study protocol was reviewed and approved by Heads of the communities of selected Local Government Areas of Bauchi State.

Results

Table 1 : Socio-economic and Demographic Information of Respondents

Variables	Frequency (n=301)	Percentage (%)
Age		
18-25	101	33.6
26-35	152	50.5
36-45	43	14.3
46-55	4	1.3
Above 55	1	0.3
Ethnicity		
Hausa	113	37.5
Fulani	65	21.6
Yoruba	5	1.7
Igbo	16	5.3
Others	102	33.9
Religion		
Islam	166	55.1
Christianity	133	44.2
Others	2	0.7
Marital Status		
Married	273	90.7
Single	8	2.7
Separated	8	2.7

Divorced	4	1.3
Widow	8	2.7
Other occupation involved		
None	118	39.2
Trader	139	46.2
Student/apprentice	26	8.6
Others	18	6.0
Monthly Income (Naira)		
<10,000	219	72.8
10,000-30,000	74	24.6
30,000-50,000	7	2.3
Others	1	0.3
Types of Housing		
Block of flat	160	53.2
Mud and zinc roof	131	43.5
Raffin palm roof	10	3.3
Household facilities		
Cars	2	0.7
Cable Television	169	56.1
Pumping Machine	11	3.7
Motor Cycle	98	32.6
Others	9	3.0
None	7	2.3
More than one option	5	1.7

Table 1 above showed the socio-economic and demographic information of respondents where 49.8% of them resides in a rural area while 50.2% resides in urban area. Majority of the respondents have between 1-2 under-5 children:63.8% and 3-5 persons in their household: 54.8% In regards to their family background, 81.1% live in a monogamous family while 18.9% live in a polygamous family. 83.7% of the respondents occupied the 1st position as wife, 13.3% are 2nd wives, 2.7% are 3rd wives while

0.3% are 4th wives. The table further reveals that majority (50.5%) of the respondents are within the ages of 26-35 years . A large majority (90.7%) of the respondents are married while the remaining percentage are single mothers, divorced and widowed. The occupation of most (46.2%) of the respondents is trading, 8.6% are students/apprentice while 39.2% of them are unemployed. Majority (72.8%) of the respondents as shown in the table earn less than ₦10,000 monthly. Most (53.2%) of the respondents lives in block of flat houses, 43.5% lives in houses made with mud and zinc roof while a very few of them (3.3%) live in raffin palm roof houses. The table also showed the household facilities of the respondents and it was discovered that only 0.7% of them have cars, 56.1% have cable television, 3.7% have pumping machine, 32.6% have motor cycle, 2.3% do not have any of the listed household facilities while 1.7% of them have more than one of the listed facilities. Majority (48.5%) of the respondents have access to NEPA source of electricity in their houses. The table also shows the access to road in the community where the respondents resides, only 8.6% of them have access to tarred road, majority (46.%) of them have access to pathways while 44.9% have access to un-tarred motor able road.

Table 2: Dietary Preferences/Food Variety of the Respondents

Variables	Mean (n=301)	Remark
CEREAL FOODS		Yes
Rice (Jollof Rice, Boiled Rice, Rice and Stew, Damai da Yaj, KunuShinkafai)	1	
Sorghum (include ready to eat products)	1	
Guinea corn (include ready to eat products)	1	
Wheat (Semolina, Spaghetti, Danwake and Bread)	1	
Millet (Include ready to eat products)	1	
Corn (Cornflake, Roasted corn, TuwonMasara and Custards)	1	
ROOT AND TUBER	1	Yes

Yam (Boiled, Pounded, Pottage, Fried)		
Cocoyam (Boiled, Pounded and Pottage)	1	
Cassava (Eba, Garri and Waina)	1	
Irish Potatoes (Fried, Boiled and Pottage)	1	
Sweet potatoes (Fried, Boiled and Pottage)	1	
Sugarcane (Rake)	1	
LEGUMES, NUTS AND SEEDS	1	Yes
Beans (Boiled, Akara, Danwake, Moi-moi, Miyan wake)		
Soyabeans (Awara, Soyamilk, Soyabeans soup and Daddawan soya)	1	
Groundnut (Roasted, Kunungyada, Miyangyada and Boiled)	1	
Bambaranut (Including Ready to eat product)	1	
Cashew nut	1	
Coconut	1	
Melon seed	1	
Locust beans (Daddawa)	1	
OIL	1	Yes
Palm oil		
Groundnut oil	0.8	
Olive oil	0.3	
DIARY		
Fura da Nono	0.8	
Cheese (Manshu)	0.6	
Evaporated milk	0.8	
Ice cream	0.6	
Yoghurt	0.6	
Viju milk	0.6	
Nutri-milk	0.7	
PROCESSED FOODS AND BEVERAGES	0.9	Yes
Non-alcoholic (Tea, Coffee, Cocoa, Milo, Bournvita and Ovaltine)		
Alcoholic (Burkutu, Stout, Lager, Beer, Star, Whiskey and Wine)	0.0	

Others (Ginger drink, Zobo, Kununzaki, Fanta and Coke)	0.9	
Sugar	0.9	

Table 2 cont'd: Dietary Preferences/Food Variety of the Respondents

Variables	Mean (n=301)	Remark
ANIMAL PROTEIN PRODUCTS		Yes
Insect (Grasshopper, termite)	0.2	
Pork (including ham and bacon)	0.1	
Lamb, Beef	0.9	
Poultry (chicken, turkey, duck and guinea fowl)	1	
Game (Rabbit, squirrel, Burgu, Grass cutter)	0.6	
Crustaceans (Prawn, Crayfish and Crabs)	1	
Fatty fish (Sardine, Mackerel and Titus)	1	
Eggs (all varieties)	1	
FRUITS	1	Yes
Orange (Lemo)		
Lemon (LemunTsami)	1	
Lime (LemunTsami)	1	
Avocado (Fiya)	0.7	
Banana (Ayaba)	1	
Plantain (Filanten)	0.8	
Apple (Tufa)	0.9	
Water melon (Kankana)	1	
Pawpaw (Gwanda)	1	
Garden egg (Yalo)	0.9	
Pineapple (Abarba)	1	
Date (Dabino)	1	
VEGETABLES	1	Yes
Lettuce (Latas)		
Cucumber (Kokumba)	0.9	
Cabbage (Kabeji)	1	
Carrot (Karas)	1	

Spinach (Aleho)	1	
Okra (Kubewa)	1	
Gauta (Bitter garden egg)	1	
Pumpkin leaf (Ugwu)	0.8	
Water leaf	0.8	
Bitter leaf (Shuwaka)	0.8	
Ginger (Citta)	1	
Garlic (Tafarmuwa)	0.9	
Moringa (Zogale)	1	
Boaboa leaves (Kuka)	1	

The table above shows the Dietary Preferences/Food Variety of the Respondents. A mean ranging from 0.5 – 1.0 revealed that the respondents consumed at least one from all the various groups of foods listed in the table.

Table 3: Proximate composition of commonly consumed complementary food (Raw) produced by Female farming communities in Bauchi states

<u>Nutrients(%)</u>	TBR	GPR
<i>Moisture</i>	3.46±0.31 ^a	3.24±0.09 ^a
<i>Crude Fibre</i>	12.15±0.06 ^a	11.44±0.08 ^b
<i>Ash</i>	4.24±0.59 ^b	4.07±0.07 ^a
<i>Protein</i>	17.91±0.09 ^b	14.45±0.45 ^a
<i>Fat</i>	2.42±0.20 ^a	2.31±0.19 ^a
<i>Carbohydrate</i>	22.42±0.24 ^a	20.12±0.40 ^a

Sample TBR (Turn Brown Raw): Soya beans, Guinea corn and Groundnut

Sample GPR (Groundnut pap Raw): Groundnut and Maize

Mean ± standard deviation values of duplicate analyses. Values with different superscripts in each column are not statistically significant at (P < 0.05).

Table 4: Proximate composition of commonly consumed complementary food (Cooked) produced by Female farming communities in Bauchi state

<u>Nutrients(%)</u>	TBC	GPC
<i>Moisture</i>	3.46±0.31 ^b	3.24±0.09 ^b
<i>Crude Fibre</i>	12.15±0.06 ^a	11.44±0.08 ^{as}
<i>Ash</i>	4.24±0.59 ^b	4.07±0.07 ^a
<i>Protein</i>	17.91±0.09 ^b	14.45±0.45 ^a
<i>Fat</i>	2.42±0.20 ^a	2.31±0.19 ^a
<i>Carbohydrate</i>	22.42±0.24 ^a	20.12±0.40 ^b

Sample TBC (Turn Brown Cooked): Soya beans, Guinea corn and Groundnut

Sample GPC (Groundnut pap Cooked): Groundnut and Maize

Mean ± standard deviation values of duplicate analyses. Values with different superscripts in each column are not statistically significant at (P < 0.05).

Table 5: Mineral contents of commonly consumed complementary food (Cooked) produced by Female farming communities in Bauchi state

<i>MINERALS</i>	TBC	GPC
<i>Sodium</i>	10.17±0.203 ^a	10.12±0.201 ^a
<i>Calcium</i>	5.24±0.104 ^a	5.21±0.101 ^a
<i>Potassium</i>	14.18±0.208 ^b	14.18±0.084 ^b
<i>Magnesium</i>	8.22±0.164 ^a	8.09±0.10 ^b
<i>Phosphorus</i>	4.17±0.083 ^a	4.11±0.17 ^a
<i>Zinc</i>	6.22±0.03 ^b	4.14±0.05 ^{as}
<i>Iron</i>	9.81±0.14 ^b	9.65±1.17 ^a

Sample TBC (Turn Brown Cooked): Soya beans, Guinea corn and Groundnut

Sample GPC (Groundnut Pap Cooked): Groundnut and Maize

Mean \pm standard deviation values of duplicate analyses. Values with different superscripts in each column are not statistically significant at ($P < 0.05$).

Based on the laboratory analysis tables, the increase in nutrient contents of cookies as observed in the proximate analysis of sample TBR (cooked) due to its enrichment by soybeans, which is adequately rich in protein, 12.95 g of protein per 100g. Sample TBC (cooked) showed relatively increase in mineral contents and was higher in sodium (10.17 ± 0.203^a), calcium (5.24 ± 0.104^a), magnesium (8.22 ± 0.164^a), zinc (6.22 ± 0.03^b) and iron (9.81 ± 0.14^b) contents than sample GPC.

DISCUSSION

In general, this study sought to assess food types and their nutritional values among female farming households in Bauchi state. Specifically, the study assessed the socio-economic and demographic information of the respondents and it was discovered that majority of the respondents have between 1-2 under-5 children, live in a monogamous family, occupies the 1st position as wife. Their level of education reveals that most of the women which are within the age bracket of 26-35 years and of Hausa ethnicity completed their primary school education and a few among them also attended post-secondary education.

The hygiene practice of the respondents revealed that the primary source of drinking water for majority of the respondents is well water. However, the colour of the water is found to be clear and taste good. In finding when the respondents wash their hands, the study revealed that majority wash their hands more than once in a day. The kind of toilet most used by the respondents is found to be pit latrine which is not a healthy practice. This could be attributed to the low income of the respondents as the predominant occupation among the respondents is trading, with a monthly earning of less than ₦10,000. This finding is supported by Shetty *et.al.*, (2014) which stated that higher incomes are thought to facilitate for exercising greater command over many goods and services that link to

promote health, better nutrition and access to clean drinking water sanitation, housing and quality health services.

The Weight-for-length/height index for child anthropometric measurement showed there is a 9.9% prevalence of severe under-nutrition among the children, 15% prevalence of wasting, 30.5% prevalence of moderate overweight and 16.7% of severe overweight. Likewise, there is a 30.5% prevalence of severe stunting and a 40.3% prevalence of moderate stunting among the children, with reference to the Length/height-for-age index. The Weight-for-age index indicates that there is a 18.6% prevalence of severe underweight and a 28% prevalence of moderate underweight among the children of the respondents. The study also assessed the body mass index of the respondents where 16.6% are underweight, majority (46.5%) are normal weight, 16.3% are overweight while 20.6% are obese.

The nutritional knowledge of the respondents was found to be commendable as a good number of them plants beans, others plants soyabeans, groundnut and sesame, but only a very few plants bambarnut. The study also revealed that rice is most planted by the respondents. However, majority of the respondents do not plant the listed fruits (watermelon, sweet melon, orange and date palm). From the results of the study it was shown that majority of the respondents plants zogale, while a good number of them plants spinach and okra. A large number of the respondents reported that they apply fertilizer and manure on their farms. In regards to drinking of water, most of the respondents are aware that it is recommended to drink 8 glasses of water per day. Also, they know that colostrum is good for new baby's health and that it is good to give only breast milk to a baby from 0-6 months. A major percentage of the respondent agrees that a mixture of sorghum, soya and groundnut makes infants (6-24months) to grow well. The study further shows that majority of the respondents agrees that eating fruits and vegetables everyday leads to good health. More so, a major percentage of the respondents believe that washing vegetables before cutting helps their body to gain the nutrients in the vegetables soup. This finding is line with Burlingame

(2011) which stated that knowledge on the individual food items consumed by a household, frequency of intake and their nutrient content helps to make to make general evaluations of the dietary practices of the household.

The findings from the study show the meal frequency pattern of the respondents. The result indicates that majority of the respondents eats the following list of foods (fried foods, variety of foods, vegetables, fruits, animal protein, roots and tubers) only for 1-2 days in a week. However, a large majority of the respondents were observed not to consume any alcoholic beverages. This could be traced to the environmental factor being that the study area is dominated by Muslims that prohibit any alcoholic substance. Likewise, majority do not consume any restrictive diet. A large number of the respondents always consume plant protein, cereals and grain products for 3 - 4 days in a week while a good number of them reported they consume plant protein, cereals and grain products every day.

Conclusion

This study assessed the food types and their nutritional values among female farming households in Local Government Areas of Bauchi state. From the findings of the study, it can be concluded that low income and environmental factors affects the food choices of female farming household as well as hygiene practice of the women. The prevalence of malnutrition especially among their children is significantly high.

Recommendations

- i. There is need to organize nutritional awareness among the females in the study area in order to encourage eating meals with plenty of fruits and vegetables.
- ii. Women education is important for reducing malnutrition and therefore the need for effective targeting of women for education programmes. To a large extent, women are responsible for feeding and caring for young children. The quality of feeding and care given

to the children would reflect the level of education of the mother when other factors are fixed. What is needed therefore is to target women with specific education and health care programs.

- iii. The provision of clean water for rural households should be taken seriously by government. Clean water will prevent the spread of water-borne diseases that can negatively affect the health and nutrition of young children. Rural households should be encouraged to provide sanitary toilets in their homes. Government can make laws that would compel rural households to observe clean and healthy environment.
- iv. The income of the female farming households should be looked into. Government in conjunction with Non-Governmental Organizations (NGOs) should carry out financial intervention or entrepreneurship programmes aimed at increasing the incomes of the women.

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