

Food Consumption Pattern, Anthropometric Measurement and Nutritional Status of Low- Income Households of Selected Federal Tertiary Institutions in Kaduna State, Nigeria

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ABSTRACT: The paper examined low-income households from selected Federal tertiary institutions in Kaduna state food consumption pattern, anthropometric and nutritional status. Two research questions and two hypotheses guided the study. The study adopted a descriptive survey research design. A sample of 232 was used for the study. Structured questionnaire and interview were used for data collection, which were analyzed using descriptive statistics and Pearson Product Moment Correlation. Findings revealed that Low-income households in Federal tertiary institutions consumed more cereals, cereal products with highest mean scores of (3.33) and legumes (2.76). They consumed little of animal protein with a mean score of (1.99) and their nutritional status was adequate using anthropometric measurement of children: height-for- age 300 (59.0%) and weight-for age 175 (34.0%); Mid-Upper –Arm-Circumference (MUAC) 286(56%) indicators level of healthy; skin fold 243 (47.6%) revealed these children were in the range of excellent, while Adult Body Mass Index (BMI) who were normal had the highest percent score (56.5%).

Keywords: Consumption Pattern, Anthropometric Measurement, Nutritional Status, Low-Income Households

INTRODUCTION

Nutritional status is the health condition of a person which is influenced by intake and utilization of nutrients. It can be assessed by a number of outcomes; most often in practice, it is estimated with growth in children and thinness in both children and adults (for protein and energy). Nutritional status involves understanding nutritional state of the body using weight, height, age or their combination, to judge an individual as having good or poor nutritional status. Many experts in the field; among them Bender and Bender (2005), defined nutritional status as condition of the body in those respects, influenced by diet: levels of nutrients in the body and their ability to maintain normal metabolic integrity. They are assessed into two groups: adults and children. For adults, Bender and Bender (2005), emphasized that general adequacy is

assessed by measuring weight and height. For example, the nutritional status of a child is an outcome of what the child eats as well as diseases he/she is suffering from or suffered over a period of time. The common indicators used for collecting nutritional and physical state of children under age five are anthropometric measurement (Delisle, 1991). It is the measurement of body size and total body composition. Herwig (2000) pointed out that the basic principle of anthropometry is that prolonged or severe nutrient depletion will eventually lead to linear retardation (skeletal) growth, loss of muscle mass and fat in children. Detecting these problems involves measuring body dimensions; such as standing height, upper-arm circumference, or total body mass (weight) (Herwig, 2000). The nutritional status of children from ages one to five years old is however measured using three

indicators: underweight, stunting and wasting (WHO, 2005). For example, underweight in children results from inadequate food intake and/or poor health, while stunting and wasting results from chronic food deprivation and chronic ill health, such as “kwashiorkor” and/or Marasmus. Adult’s nutritional status is measured using Body Mass Index; that is, weight (kg) to height (m²), percent body fat and Mid- Upper- Arm- Circumference. Body fat may also be estimated, by measuring skin fold thickness, and muscle diameter. Children’s weight and height -for- age are compared with standard data for adequately nourished children (WHO, 2005). Adults eating pattern and changes in dietary pattern would have serious effect on their nutritional status. For example, reduced intake of fresh vegetables, fish, fruits and meat, would affect adult’s nutritional status (FAO, 2001; FAO, 2003).

Food consumption refers to the amount of food available for consumption as estimated by Food and Agricultural Organization (FAO, 2003). The pattern describes variations in goods and services consumed. An individual’s decision on what range and type of commodity to consume is influenced by many factors; such as income, food prices, food habit and cultural taboos, nutrition knowledge, food preparation and so on. All these interact in a complex manner to shape food consumption pattern. Smith and Haddad (2000) advised that for easy absorption by the human body, nutrients must be consumed in appropriate combinations. For example; nutrients such as carbohydrate, protein, fat and micro-nutrients need to be consumed in combination with other nutrients for easy absorption. The study therefore is aimed at determining the food consumption pattern, anthropometric measurements and nutritional status of low income households of selected Federal tertiary institutions in Kaduna state Nigeria. Specifically, this paper;

1. determined the food consumption pattern and the nutritional status of low-income households of selected Federal Tertiary Institutions in Kaduna state, Nigeria.
2. established the anthropometric measurement and nutritional status of the low- income households of selected Federal Tertiary Institutions in Kaduna state, Nigeria.

Research Questions: The research questions adopted provided answers to the following

1. What is the food consumption pattern and nutritional status of the low-income households of selected Federal Tertiary Institutions in Kaduna state, Nigeria?
2. What is the anthropometric measurement and nutritional status of the low-income households of selected Federal Tertiary Institutions in Kaduna state, Nigeria?

Research Hypotheses: The following null hypotheses guided this study:-

1. There is no significant relationship between consumption pattern of food and nutritional status of the low- income households of selected Federal Tertiary Institutions in Kaduna state, Nigeria.
2. There is no significant relationship between anthropometric measurement and nutritional status of the low-income households of selected Federal Tertiary Institutions in Kaduna state, Nigeria.

METHODOLOGY

A descriptive survey design was used to obtain data in this study. Population for the study however consists of low-income families in seven (7) Federal Tertiary Institutions in Kaduna State they are: Samaru College, ABU, Zaria; Chemical and leather Technology, Zaria; Federal College of Education, Zaria; Federal Polytechnic, Kaduna; Nigerian College of Aviation,

Zaria; National Institute for Transport Technology, Zaria and National Research Institute for Chemical Technology, Zaria. Total population of the household was 1552. The sample size was 232 households using multistage sampling technique. The number of respondents' households from each institution was selected using proportional sampling method of 15% to select, 50, 25, 40, 46, 29, 14, 28 household heads respectively giving a total of 232 households for the study (Bello and Ajayi, 2000). These households were purposively selected based on their income level. Retrieved questionnaire sample size data were from 219 household heads and 510 other family members (six members from a family, i.e., father, mother and four others) for the anthropometric data collection which gave a total of 729 households (Omobude *et al.*, 2009). The sample area; which includes the low-income households in the selected institutions in Kaduna State of Nigeria, was sampled from department/programme of the institutions.

Anthropometric measurement followed standardized procedures and was fully described. Weight and height were measured for each subject, from which BMI was calculated. Tools used for height and weight measurements were calibrated bathroom scales taken using a portable platform Camry scale and the weighing machine floor type mode; used to assess Body Mass Index of household members. Mid-Upper-Arm-Circumferenceinsertion tape and skin fold caliper were used to assess body thickness. Recommended international cutoffs were used to calculate underweight (BMI- ≤ 18) and normal (BMI - 18 - 24.99), overweight (BMI- 25 - 29.99) or obese (BMI - ≥ 30).

Food intake was assessed using food frequency questionnaire to collect information of respondents' food intake through food list taken most often, often, sometimes and occasionally; while 24hour-recall food intake contained times food was consumed starting from the previous day. Enumerators, social workers and medical personnel's were used for data collection. The enumerators and socialworkers were trained on how to interpret questions in the questionnaire to low-income households who cannot read and understand the contents. The studyemployed the services of medical personnel's trained on measurement of skin fold using caliper, Mid-Upper-Arm-Circumference with insertion tapes, weight and height of individuals with the use of scale and tape for Body Mass Index. Height was measured with a metal rule, while skin fold measurement was obtained on mid-line of anterior (front) surface of the arm with a caliper. Mid-Upper-Arm-Circumference was measured using a flexible tape. Standard techniques were used to take measurements of skin fold and MUAC. The BMI was calculated from height and weight measurements, using weight in (kg) \div height (m^2).

Descriptive statistics; such as frequencies, percentages, bar and pie chart were used to describe the anthropometrics. This was used because they involved quantitative analysis of data and those for anthropometric and the consumption pattern of food are large. Statistical Package for Social Sciences (SPSS) 17th version was used to test null hypotheses at $P < 0.005$ level of significance. Pearson Product Moment Correlation was used to test two hypotheses that involved two or more variables. Variables determined included Consumption pattern of food, anthropometric measurement and nutritional status of respondents.

RESULTS

Table 1: Distribution of Households on Opinion for Food Consumption Pattern

S/No	Food Group	Pattern of Food Consumption				Mean	Decision
		Most Often (4)	Often (3)	Sometimes (2)	Occasionally (1)		
1.	Fruits (e.g., orange, banana)	3	44	133	39	2.05	Not Agreed
2.	Vegetables (e.g. okro, spinach)	4	82	111	22	2.31	Not Agreed
3.	Roots/tubers (e.g., sweet potatoes, yam)	7	76	103	33	2.26	Not Agreed
4.	Meat (e.g., beef, goat meat)	7	37	123	52	1.99	Not Agreed
5.	Fish (e.g. frozen fish, dry fish)	6	66	136	11	2.28	Not Agreed
6.	Grains (e.g. maize, millet)	121	71	6	21	3.33	Agreed
7.	Legumes (e.g. bean, soya bean)	27	125	55	12	2.76	Not Agreed

Decision rule = 3; N = 219

Consumption pattern of food items by the low-income household respondents' displayed in Table 1 revealed that cereal grains (e.g. maize, millet etc) were most consumed food items by the low-income households, as this attracted highest mean consumption level of 3.33. Subsequently, 121 respondents consumed cereal grains most often while 71 others consumed it often. Legumes (e.g. beans, soya beans etc) were the second most consumed food items and attracted second highest mean consumption level of 2.76. Accordingly, 27 respondents consumed legumes most often while 125 respondents consumed it often. The least consumed food items were meat (e.g. beef, goat meat etc) which attracted least mean consumption level of 1.99. Table 1 also showed that only 7 respondents consumed meat most often, while 37 others consumed it often. However, 123 respondents consumed meat sometimes while the rest 52 respondents consumed meat food items occasionally. This shows that most consumed food items by the low-

income households was cereal grains (e.g. maize, millets etc), while the least most consumed food items was meat or meat items.

Twenty-Four Hours Recall Food Intake: Eating Occasion

Figures 1a and 1b revealed the eating occasion data of respondents. From the distribution, it could be seen that majority of respondents took part in morning and evening meals. This is because 209 (95.4%) were usually present during morning and evening meals while the rest 10 (4.6%) were not. In the same vein, a total of 209 (95.4%) were present during evening meals while the rest 10 (4.6%) were not. Figure 1c illustrates the time various foods were consumed by households. The Figure indicated that 174(79.5%) household consumed morning meal between 6am-7am against 45(20.5%) that consumed between 8am-9.30am. Thus, majority of the low-income households had their breakfast before going to work and children taking off for school. Figure 1d

revealed that between 11.30am-12noon 125(57.1%) household members had mid-morning snacks. However some members were not accustomed to taking mid-morning snacks. 26(11.9%) had their snacks between 12.30pm-1pm and 16(6.4%) between 1.30pm -2pm. The implication is that high frequency rate intake of 57.1% could be because of the number of school age children and adolescents present in the family. Data from Figure 1e revealed that lunch was most consumed between 1pm-2.30pm, with a high frequency of 140(63.9%) which 67(30.6%) consumed their lunch between 2.30pm-3pm. This implies that the low-income households considered lunch more important and was required to replace expended energy during work hours or after school. Figure 1f shows the distributions of evening meal with 6-7pm having highest score of 85(38.8%), 8-9pm and 4pm to 5.30pm having 66(30.1%) and 56(25.6%) respectively. This implies that more people had their meals between 4pm to 9pm every day. Figure 1g revealed that 105 (47.9%) of the respondents consumed their after- evening meals between 10pm-11.30pm, while 13(5.9%) did so between 12midnight to12.30am. However 101(46.1%) did not consume any food after they had their actual evening meal; implying that those who did not eat may not be interested because, they were satisfied with their last meal. See figures 1a-1g below.

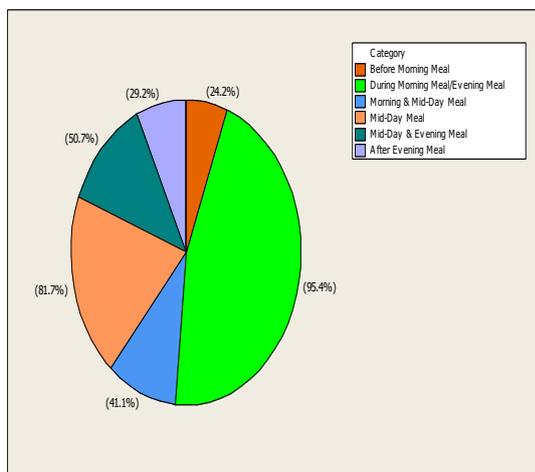


Figure 1a: Distribution of Household Members Present During Meal among Low-Income Households, Kaduna State

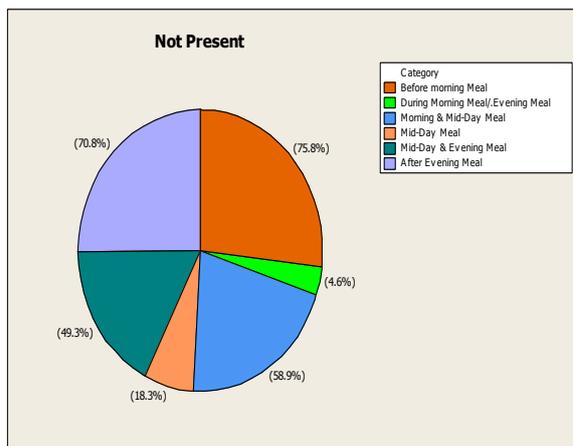


Figure 1b: Distribution of Household Members Absent During Meal Time Among low-income households, Kaduna state

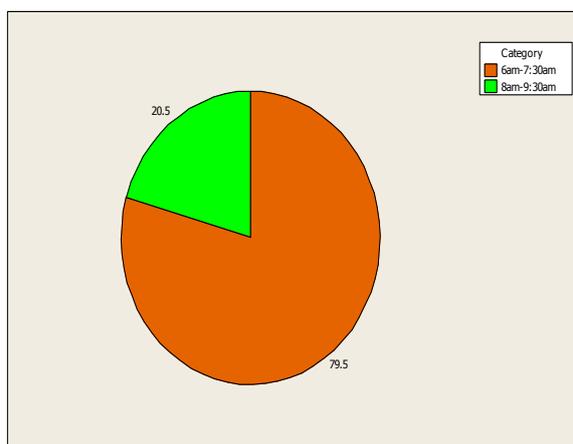


Figure 1c: Distribution of Time Lunch Was Consumed Among low-income Households, Kaduna State

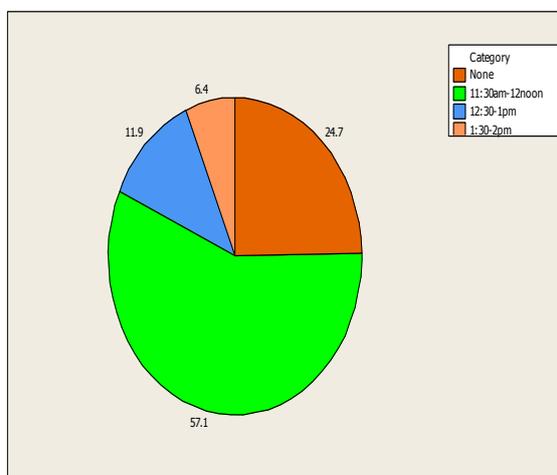


Figure 1d: Distribution of Time Mid-Morning Snack was Consumed Among Low-Income Households, Kaduna State

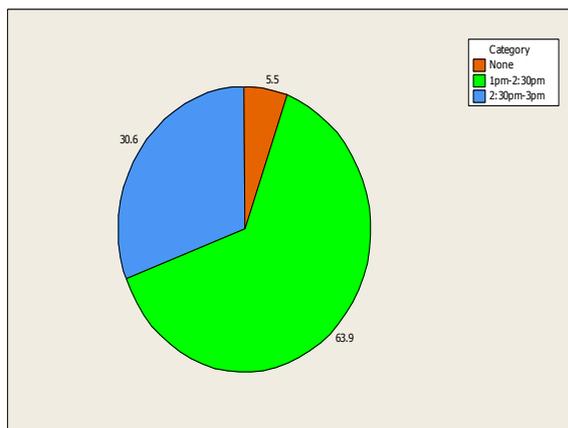


Figure 1e: Distribution of Time Lunch Was Consumed Among Low-Income Household, Kaduna State.

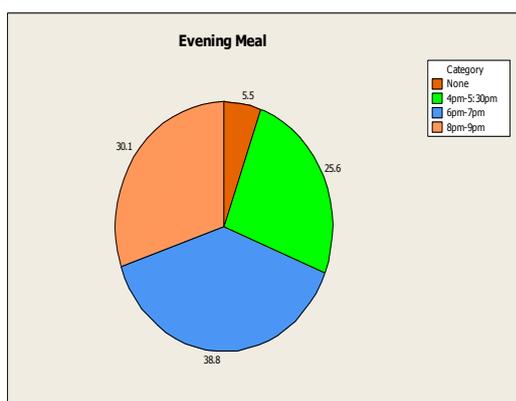


Figure 1f: Distribution Of Time Evening Meal Was Consumed Among Low-Income House -Holds, Kaduna State.

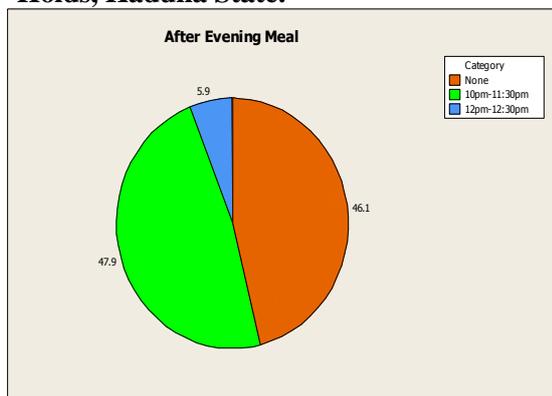


Figure 1g: Distribution Of Time After Evening Meal Was Consumed Among Low-Income Households, Kaduna State.

**Anthropometric Measurements:
Anthropometric Indicators of Children
Above and Below Median Reference
Standard**

Figure 2a data revealed a total of 510 children aged below 18 years in this study. A total of 300

(59.0%) have height- for- age that agrees with the reference standards, while the rest 210 (41.0%) have height- for- age that do not agree with the reference standard. Figure 2b also revealed, a total of 335(66.0%) out of 510 of children in the study who have weight- for - Age that agreed with the reference standard, while the remaining 175(34.0%) have weight- for- age that does not agree with the reference standard. Data on Figure 2ci showed the indicators' levels of children's Mid-Upper-Arm Circumference.

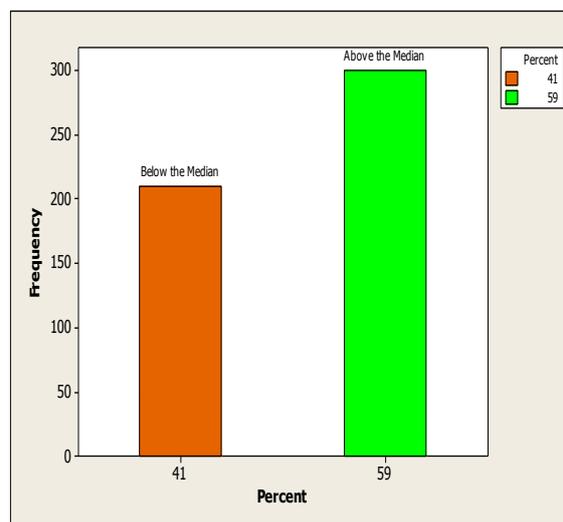


Figure 2a: Distribution of Height for Age of Children between Ages 1-17 Years Among Low- Income Households In Kaduna State

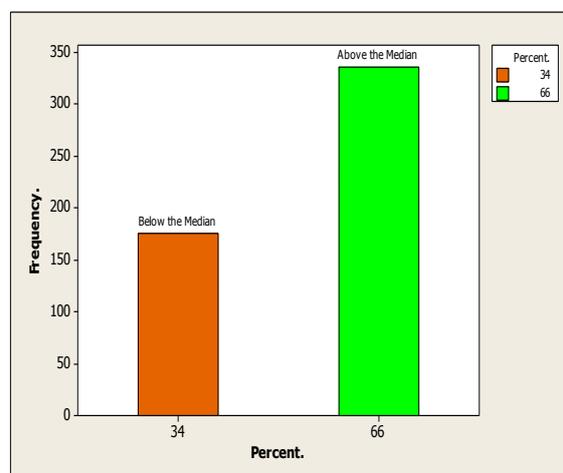


Figure 2b: Distribution of Weight for Age of Children between 1-17 Years Among Low- Income Households In Kaduna State

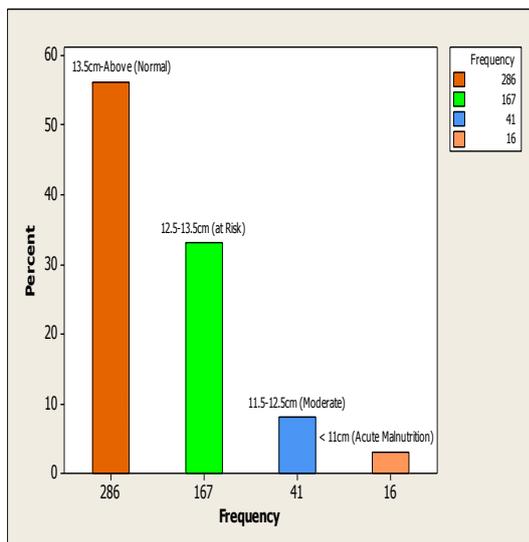


Figure 2c: Distribution of Children’s Mid-Upper-Arm-Circumference Among Low-Income Households, Kaduna State

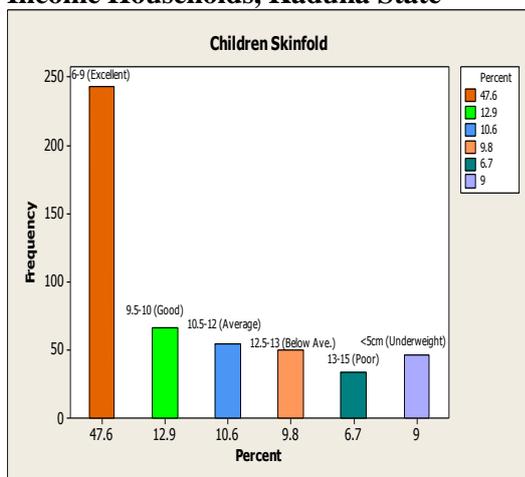


Figure 2d: Distribution of Children’s Skin fold of Low-Income Households, Kaduna State

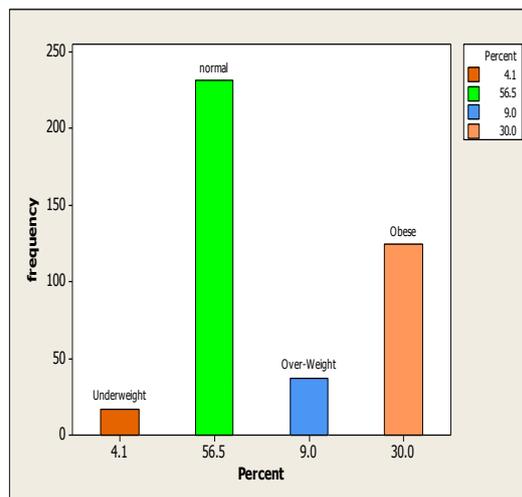


Figure 2e: Distribution of Adult Body Mass Index (BMI) of Low-Income Households, Kaduna State.

The data revealed that 286(56%) of children were healthy compared to 211(44%) that ranges from at risk to moderate to acute malnutrition. Children’s skin fold results in figure 2d revealed that 243(47.6%) were in the range of excellent (6-9cm), while 66(12.9%) were in the good range. Data revealed also that between 54 (10.6%), 50 (9.8%), 46 (9.0) and 34 (6.7%); were in the range of average, below average, underweight and poor categories respectively. According to Figure3eout of the total 409 adults respondents in this study, 231(56.5%) BMI results were normal as against 124(30%) who were obese. 37(9.0%) were overweight, while 17(4.1%) were underweight.

Test of Hypotheses

Null Hypothesis One: There is no Significant Relationship Between Consumption Pattern of Food and Nutritional Status of Low- Income Households of Federal Tertiary Institutions of Kaduna State.

Table 2: Pearson Product Moment Correlation Results on the relationship between Consumption Patterns of Food and Nutritional Status Of Low-Income Households, Kaduna State

Variables	N	Mean	Standard Deviation	Df	Correlation Index (r)	Sig (p)
Consumption Pattern of Food	219	22.31	4.01	217	0.477**	0.000
Nutritional Status	219	11.50	5.38			

Correlation is significant at the 0.005 level

Table 2 shows outcome of the Pearson Product Moment Correlation (PPMC) statistics which revealed significant relationship between consumption pattern of food and Nutritional status of low income households in selected tertiary institutions, Kaduna state. This is because the calculated P value of 0.000 was less than 0.05 level of tolerance. The level of relationship between the two variables was high considering that the correlation index level was $0.477 < 0.05$. This outcome implies that the food consumed had significant ($P < 0.05$) influence on nutritional status of the low income household. The null hypothesis which states that there is no significant relationship between consumption pattern of food and Nutritional status of low income households in selected Federal tertiary institutions, Kaduna state was rejected.

Null Hypothesis Two: There is no Significant Relationship Between Anthropometric Measurements and Nutritional Status of The Low-Income Households of Selected Federal Tertiary Institutions Kaduna State, Nigeria.

Table 3: Pearson Products Moment of Correlation Results on The Relationship Between Anthropometric Measurements and Nutritional Status of Low-Income Households, Kaduna State

Variables	N	Mean	Standard Deviation	Df	Correlation Index	Sig (p)
Anthropometric Measurement	219	46.88	4.91	217	0.51**	0.036
Nutritional Status	219	11.49	5.37			

Correlation is significant at the 0.05 level

Outcome of the Pearson Product Moment Correlation (PPMC) statistics in Table 3 revealed that significant relationship exists between the Anthropometric Measurements and the Nutritional status of low income households of Federal tertiary institutions of Kaduna state. This occurred because calculated P value of 0.036 was less than 0.05 level of tolerance at a correlation index r level of 0.506. Consequently, the null hypothesis which states that there is no significant relationship between Anthropometric Measurement and the Nutritional status of low income households of Federal tertiary institutions of Kaduna state was rejected.

DISCUSSION

The study revealed that many households eating occasions were more during the morning and evening meals. Most households in the study area commonly do not consume three meals per day. To some, this could be a way of rationing in the face of food shortages; in alliance with Baker (2003), that low-income households skip meals because they do not have enough access to food.

Similarly, opinion of households on time during which foods were consumed by households favoured between 6-7am during morning meal and 11.30-12 noon during mid-morning snacks. However, most households did not consume food after evening meal, perhaps many of them would have gone to sleep earlier than the eating time. These findings support Oranusi *et al.*, (2007), opinion that any reduction in food

intake can result to a reduced amount of macronutrients; justifying significance of eating time on food intake per day for household members.

Respondent's opinion on effort towards improving their nutritional status used two parameters; namely, anthropometric measurement and 24hour-recall food intake. Findings indicated that significant relationship exists between anthropometric measurement and nutritional status of low-income households. Accessing outcome of respondent's food intake was done through anthropometric measurements. The results revealed anthropometric analysis of children less than 18 years were above the median reference standard for height and for weight.

According to the findings on relationship between anthropometric measurement and the nutritional status, the results showed growth rate as indicated by weight and height, may have made significant contribution to nutritional status; hence, the significant relationship between it and anthropometric measurement. The result is an indication of consumption pattern and nutritional status that could influence growth. World Health Organization (2010) provided a menu guideline which suggested that timing is important for adequate feeding and that any indication of standard weight and height is a function of individual nutritional status which in itself is dependent on how regular and adequate the meal is taken.

The body mass index categories of underweight, normal weight, over weight and obese results revealed that underweight occurred rarely in low-income households of selected Federal tertiary institutions in Kaduna State. In contrast, some adults were seen with a relatively high rate of obesity. Despite the fact that there was evidence of insufficient quality of food and nutrition by this class of respondents, their food intake was predominantly over nutrition rather than under nutrition. This finding could indicate a potential for susceptibility to ailments like hypertension and diabetics; as obesity predisposes one to hypertension and diabetics (Puoane, *et al*, 2002; Venkateswarlu, 2011). In another situation, a change in dietary pattern and change of lifestyle will significantly affect the nutritional status of adults (FAO, 2001; 2003).

In order to ascertain the improvement in household food consumption, Wyshak (2000) recommended that eating occasion be used in conjunction with the number of different food groups be consumed in a household. This provides a measure of the quality of diet consumed, thus serving as an important complement to the eating occasions indicator. The dietary intake of household members must be adequate in quantity and quality. Smith and Haddad (2000) advised that for easy absorption by the human body, nutrients must be consumed in appropriate combinations. For example, nutrients such as carbohydrate, protein, fat and micro-nutrients need to be consumed in combination with other nutrients for easy absorption. This can only be feasible if at household level decisions are made on what food is put on the table. For example, food demands by members, and who is to eat the foods (intra- household distribution) determines composition of meals for individuals.

CONCLUSION

Households in Federal Tertiary Institutions studied consumed more cereals, cereal products and legume products. They however had low access and consumed little of animal protein. Also, the low-income household's nutritional status was adequate using anthropometric measurement's of children: height-for- age and weight-for-age; Mid-Upper-Arm-Circumference and Skin Fold. Nutritional status and

consumption pattern of low-income household members were adequate in carbohydrate and plant proteins.

RECOMMENDATIONS

Health workers and Home Economics Extension Agents should create further education/awareness on the importance of animal protein, how to access and use them along with plant protein and vegetables through workshops, cluster group discussions, posters, radio, television and jingles, to improve on consumption pattern and nutritional status of low-income households.

Non-governmental organizations (NGO's) and Community Based Organizations (CBOs), Nutritional Associations and Home Economists should advocate for improvement on food and nutrition security formaintaining adequate health status and appropriate food consumption. This could be achieved through awareness campaign, seminars and workshops to benefit low-income household workers of selected Federal tertiary institutions in Kaduna State and Nigeria as a whole.

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