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Assessment of Food Expenditure Pattern and Nutritional Status among Adults in Agro-Ecological Zones of Nigeria

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Abstract

This study examined the pattern of food expenditure and nutritional status among adults in agro-ecological zones of Nigeria. Specifically, the study determined socioeconomic characteristics of the respondents, food expenditure patterns and nutritional status. Survey design was adopted for the study. The population composed of all male and female adults aged 18 years and above in the household across the six agro-ecological zones in Nigeria. Data were collected using questionnaire. Nutritional status was determined using Body Mass Index (BMI) which was calculated from anthropometric measurements. Food expenditure was measured through per capita monthly expenditure on food. Data were analyzed using frequencies, percentages and chi-square. Findings show that more than two-third (67.3%) were male while 32.7 percent were female. Nutritional status revealed that overweight condition was greater (18.1%) among male than female (9.8%) while obesity was higher (13.8%) among female than male (6.9%) across all the zones. Age group of 31- 60 years were overweight (20.5%) and obese (16.5%) than others. Food expenditure patterns revealed higher *percapita* monthly food expenditure on meat (₦3,000.00), dairy products (₦2, 200.28), refined grains (₦2,000.00) and fat and oil (₦1,880.90) whereas lower expenditure was recorded on fruit and vegetables (₦290.57) for obese adults than underweight, normal weight and overweight adults. Normal weight adults spend more money on diet rich in fruit and vegetable than overweight or obese adults, therefore, nutrition education with focus on fruit and vegetable consumption is advocated.

Keywords: Adults, Assessment, Body Mass Index, Expenditure Pattern, Food, Nutritional, Status

Introduction

Food consumption in households does arise from purchases, thus, to ascertain the variations in the pattern of food consumption and nutritional status, there is a need to understand the

pattern of food spending. However, identifying the aspect of food intake that drives this among the adult population is arduous because information that influences food choices is often unavailable.

Nutritional status refers to an individual's health condition as a result of the ingestion, absorption, and utilisation of food nutrients (Todhunter, 1970). Its assessment in adults is done in various ways, however, the most commonly used in nutrition research include anthropometry, which is measured via body mass index, classifying adults as underweight, normal weight, overweight or obese (Caputo *et al.,* 2003). Unhealthy food consumption pattern has been identified as a significant cause of over-nutrition, which brings about overweight and obesity. These conditions develop when there is an imbalance between calories consumed and calories expended, mostly due to inadequate consumption of unhealthy foods high in fat and physical inactivity that cut across all age groups (Oke *et al.* 2019). In Nigeria, the rising incidence in the shift of nutritional status of adults from underweight to overweight has been linked to numerous factors, which include consumption of highly processed foods / unhealthy food consumption patterns, declining physical activity, rising income and urbanisation (Kayode and Alabi, 2020).

In Nigeria, food expenditure differentials among household members existed due to variations in several factors like availability of food items and food prices, preferences, cultural differences and lack of resources, as documented by Romling and Qaim (2011). In addition, cultural differences exist in the ethnic distribution of the population in terms of the type of food eaten and the kind of physical activities they engage in. For example, the Northern agro-ecological zone is primarily composed of the Hausas-Fulanis, which had a dietary composition with higher rice and maize consumption. At the same time, the South-east population meal is primarily made up of yam and cassava (Akarolo-Anthony *et al.* 2013). Furthermore, people in the Northern zone also engage in more physically tasking agricultural activities than their Southern counterparts. Thus, these variations across the country have implications for within-country variations in nutritional status distribution among adults in Nigeria.

Examining food expenditure patterns at the household level serves as an instrument for assessing adult household members' food consumption patterns as well as nutritional status. Household food expenditure and consumption data measures dietary intake by combining data on food consumption from three different sources, namely, (food items purchased from the market, food items given as gifts and food items taken from personal production or stocks) and the duration extends beyond 24 hours. The household consumption and expenditure surveys (HCES) are important information sources on household and individual food choices. Earlier studies by Romling and Qaim (2011) have transformed HCES data

into estimates of dietary intake to make recommendations on nutritional policy and planning.

In addition, food expenditure data show how much is being spent by an individual or a household on different types of foods that can used to describe dietary patterns and quality, which in turn inform the nutritional status categories measured by body mass index. Furthermore, the relationship between expenditure pattern on specific food and nutritional status have been documented. For example, Sari *et al.* (2010) found that higher household expenditure on foods from animal sources and non-grain reduced stunting risk among children ages 0–59 months in Indonesia. In these studies, expenditure information on particular food groups and food group combinations documented in the literature to contribute to overweight and obesity were employed. Several studies, including Ozughalu (2016), have linked the HCES data to food security and poverty. However, few studies, except for Romling and Qaim (2011), exist in the literature that linked household food consumption and expenditure data to adults' nutritional status, particularly in low-income countries like Nigeria. Additionally, earlier studies on the subject in Nigeria have used state and local government case studies for micro-level research (Raimi et al. 2015). This study on food expenditure patterns and nutritional status determinants in Nigeria departs from earlier studies on food consumption and nutritional status by utilising the primary data collected through a structured questionnaire from 1,480 adults in households across the agro-ecological zones of Nigeria. The Partnership for Aflatoxin Control in Africa (PACA) of the Africa Union Commission (AUC) funded the data collection. This study proxied individual consumption levels with per capita food expenditure data adapted from Romling and Qaim (2011). To know the dietary composition of adults of different nutritional status categories, that is, the different kinds of food purchased and consumed by underweight, normal weight, overweight and obese adults, their *per capita* monthly food expenditure was used.

Purpose of the study

The major objective of this study was to assess the food expenditure pattern and nutritional status of adults (18 years and above) across agro-ecological zones of Nigeria. Specifically, the study:

1. described the socioeconomic characteristics of respondents in the study area;
2. determined the nutritional status of respondents in the study area
3. compared expenditure pattern on foods among different nutritional status categories of respondents in the study area,

Methodology

***Design of the Study*:** Survey design was adopted for the study. Food expenditure data were collected from the respondents by asking them to provide information on how much was spent on the different food items listed in the questionnaire every week. This was repeated over a period of one

month. Nutritional status was assessed using Body Mass Index.

Area of the Study: The study area was made up of six agro-ecological zones of Nigeria. Nigeria is grouped into six agro-ecological zones, comprising of 36 States and a Federal Capital Territory. A projection of the census figures posits that Nigeria's population is currently 193.3 million people (National Bureau of Statistics, NBS, 2017). A survey by Statistia (2021) has it that Nigeria has over 70% of its labour force engaged in agriculture. Other agricultural enterprises in the country are livestock such as poultry, piggery, sheep and goat and fish farming. Its water bodies are also suitable for fishing, irrigation and transportation. The shift in the nutritional status towards obesity has increased recently due to factors including widespread rural-urban migration, technological advancement, mechanisation of farming activities and changes in food consumption patterns across different regions of Nigeria (Olayiwola et al. 2010). This has a negative impact on Nigerians' nutritional status and wellbeing. Nigerians' lifestyle patterns have undergone significant change as a result of technological advancement, including an increase in the middle class' consumption of calorie-dense foods and beverages, a rise in the trend of fast food consumption due to work pressure, and a lack of access to regular exercise.

Population for the Study: This study covered adults (male and female aged 18 years upward) from the six agro-ecological zones of Nigeria. They are the population because the decision on monthly expenditure on different food items in the household lies with them and also, they constitute the economically active population with engagements in different livelihood activities. Furthermore, the literature also established that this group consume energy-dense foods and exhibits a sedentary lifestyle that promotes overweight and obesity as a result of work pressure, which often deprives them of access to regular exercise. Adult population in Nigeria was put at an estimate of 109,810,327 persons (World Population Review, 2023).

***Sample for the Study*:** A multistage sampling procedure was employed in selecting the respondents. In stage one, a random selection of two states each from the six agro-ecological zone was done to give 12 states as indicated above. Following the Agricultural Development Programme (ADP) grouping, five blocks were randomly selected per State, giving a total of 60 agricultural blocks in stage two. In stage three, 3 cells were randomly selected per block, which gave a total of 180 cells. In the last stage, proportionate sampling to size was done to give 1,480 households from which data were collected through personal interviews of the adults. The states that were selected from the agro-ecological zones are: Katsina and Kano (Sahel Savanna agro-ecological zone); Sokoto and Jigawa (Sudan Savanna agro-ecological zone); Niger and Taraba (Southern Guinea Savanna agro-ecological zone); Kaduna and Bauchi (Northern Guinea Savanna

agro-ecological zone); Oyo and Nasarawa (Derived Savannah agro-ecological zone) and Cross-River and Lagos (Humid Forest agro-ecological zone).

Instrument for Data Collection: Data were collected through the use of a structured questionnaire that was divided into three sections. Section A consists of questions on the socioeconomic characteristics (age, sex, occupation, income level, educational qualification and so on) of the respondents. Section B consists of the anthropometry measurements of the respondents. Section C was on monthly food expenditure.

***Nutritional Status*:** This was assessed using Body mass index (BMI**).** Their weights were measured in kilograms using a portable bathroom scale. Respondents' height (in meters) were obtained using a vertically calibrated metre rule.

The body mass index (BMI) of the respondents was determined by dividing the weight (kg) of each respondent by the square of their height in metres. The values obtained were compared with the World Health Organization reference values in order to classify them into different nutritional status categories.

$$\text{Body Mass Index, BMI} = \frac{\text{weight in kiogramme}}{\text{height in metre squared}}$$

An adult is underweight if BMI (< 18.5kg/m2), normal weight (18.5 - 24.99 kg/m2), overweight (25 - 29.99 kg/m2) and obese (≥30 kg/m2).

Per Capita Food Consumption and Expenditure: Food consumption (expenditure) data were collected from each household every week during the survey period of one month. There are 14 food commodities in all, which were further compressed into nine food groups based on nutrient similarities. Expenditure on food in Naira was expressed in terms of the total amount of money spent on different food items consumed in the household over one month.

As used in this study, per capita expenditure on food refers to individual food consumption or intake level. *Per capita* food expenditure on each food item was obtained by dividing the total monthly expenditure on each food item by the household size.

$$\text{Per capita food expenditure} = \frac{\text{household total food expenditure}}{\text{household size}}$$

The third objective was to know the dietary composition of adults of different nutritional status categories, that is, the kinds of food mainly purchased and consumed by underweight, normal weight, overweight and obese adults. This was achieved through *per capita* monthly food expenditure on different food groups. The nine food groups considered include cereals (rice), root and tuber crops (cassava and yam), legumes (beans), animal products (meat and fish), dairy products (milk), fat and oil, vegetables, fruits and processed foods (refined grains, e.g. spaghetti, noodles, custard and bread). Earlier studies as documented by Romling and Qaim (2011) reported higher *per capita* expenditure on processed foods and refined grains,

meat, fat and oil and dairy products but a lower *per capita* expenditure on fruits, vegetables and unprocessed staples like rice, millet, maize, and root and tuber crops among overweight and obese adults.

Data Collection Method: One thousand four hundred and eighty (1,480) copies of the questionnaire were administered to the respondents by hand. The entire 1,480 copies were correctly filled and collected back. This implies 100 percent return.

***Data Analysis*:** Data on the adults' socioeconomic characteristics, anthropometrics and food expenditure were collected with the aid of a questionnaire. These were coded (in an Excel spreadsheet) and analysed using descriptive statistics (frequencies, percentages). To test whether a significant relationship exists between food expenditure patterns and nutritional status measured through body mass index, chi-square test was used.

RESULTS

Socioeconomic characteristics of respondents

Data analysis on the distribution of respondents according to sex reveals that majority (67.3%) were male while 32.7% were female. Majority (90.8%) were less than sixty years old while very few (9.2%) were above sixty years old. A cumulative of 77.5% had formal education out of which 28.0% had tertiary form of education. Also, 22.4% had non-formal education. This suggests a high literacy rate among the respondents. Farming and Trading (44.1% and 33.9%) respectively constituted dominant occupation category with very few (12.4%) into civil service. Majority (89.5%) of the respondents earned less than ₦ 100,000 monthly as income (low income group) with very few (2.7%) earning above ₦ 200,000 monthly. The average monthly income was ₦50, 984.35.

Table 1: Frequency and Percentage Distribution of Respondents according to Body Mass Index

Variables	F (%) (N = 1480)
<18.5 kg/m^2 (Underweight)	99 (6.7)
18.5-24.99 kg/m^2 (Normal weight)	660 (44.6)
25-29.99 kg/m^2 (Overweight)	414 (27.9)
≥30 kg/m^2 (Obese)	307 (20.7)
Mean BMI + Std. Dev. (kg/m^2)	25.73 + 1.2

Table 1 shows the respondents' body mass index distribution. More than one-quarter (27.9%) of the respondents were overweight while 20.7% were obese. Also, a large number (44.6%) of the adults were of normal weight while very few (6.7%) were underweight. The mean body mass index across the geopolitical zones was 25.73kg/m^2 implying that an average adult is at risk of being overweight which has a lot of nutritional and economic implications if not curtailed.

Body Mass Index of Respondents

Table 2: Frequency and Percentage Distribution of Respondents' Body Mass Index by Socioeconomic Characteristics

Socioeconomic characteristics	UW (F %)	NW (F %)	OW (F %)	OB (F %)
Sex				
Male	69 (4.6)	555 (37.5)	269 (18.1)	103 (6.9)
Female	30 (2.0)	105 (7.1)	145 (9.8)	204 (13.8)
Age in years				
18-30	36 (2.4)	171 (11.5)	71 (4.8)	41 (2.8)
31-60	57 (3.8)	420 (28.4)	304 (20.5)	244 (16.5)
61 and above	6 (0.4)	69 (4.7)	39 (2.6)	22 (1.5)
Marital status				
Single	7 (0.4)	34 (2.3)	21 (1.4)	19 (1.3)
Married	92 (6.2)	626 (42.3)	393 (26.5)	288 (19.5)
Education				
Non-formal	30 (2.0)	153 (10.3)	86 (5.8)	63 (4.2)
Primary	22 (1.5)	141 (9.5)	70 (4.7)	63 (4.2)
Secondary	28 (1.9)	205 (13.9)	122 (8.2)	82 (5.5)
Tertiary	19 (1.3)	161 (10.9)	136 (9.2)	99 (6.7)
Occupation				
Farming	37 (2.5)	333 (22.5)	167 (11.3)	116 (7.8)
Trading	36 (2.4)	175 (11.8)	169 (11.4)	121 (8.2)
Civil servant	11 (0.7)	63 (4.3)	57 (3.9)	53 (3.6)
Artisan	6 (0.4)	52 (3.5)	8 (0.5)	3 (0.2)
Full housewife	6 (0.4)	7 (0.5)	3 (0.2)	2 (0.1)
Others	3 (0.2)	30 (2.0)	10 (0.6)	12 (0.8)
Income (Naira/month)				
<100,000	99 (6.7)	560 (37.8)	398 (26.9)	268 (18.1)
100,000-200,000	-	100 (6.7)	6 (0.4)	9 (0.6)
>200,000	-	-	10 (0.6)	30 (2.0)

UW = Underweight (n = 99); NW = Normal weight (n = 660); OW = Overweight (n = 414); OB = Obese (n = 307)

Table 2 shows the body mass index distribution of the respondents according to their socio-economic characteristics. The prevalence of overweight was higher in male than female (18.1% as against 9.8%) whereas obesity was higher (13.8%) among female than male (6.9%). The highest prevalence of obesity (16.5%) was seen among the age group 31- 60 years compared to other age group, this also applies to overweight respondents. According to marital status, married respondents were prone to obesity (19.5%) than the singles (1.3%). Respondents with the highest level of education were more overweight (9.2%) and also obese (6.7%) than others. Considering occupation, the traders were more overweight (11.4%) and obese (8.2%) than those in other occupation category. The prevalence of overweight and obesity reduces with income. Highest occurrence was seen among respondents that earn less than N100, 000 monthly as 26.9% and 18.1% were overweight and obese respectively in this income group.

Table 3: Per Capita Monthly Expenditure on Food in Naira (₦) according to Body Mass Index

Food items	Underweight	Normal weight	Overweight	Obese
Rice	₦903.33	₦ 1,963.13	₦ 1,071. 83	₦ 1,600.00
Cassava	₦ 376.03	₦ 714.49	₦ 217.73	₦ 608.56
Yam	₦ 548.49	₦ 565.02	₦ 1,867.00	₦ 1,423.78
Beans	₦ 374.24	₦ 1,155.52	₦ 520.62	₦ 1,080.66
Meat	₦ 1,082.67	₦ 1,462.03	₦ 2,400.00	₦ 3,000.00
Fish	₦ 650.97	₦ 1,400.00	₦ 702.61	₦ 564.40
Milk	₦ 297.12	₦ 520.31	₦ 1,319.85	₦ 2,200.28
Fat and oil	₦ 220.32	₦ 730.48	₦ 1,334.05	₦ 1,880.92
Vegetables	₦ 62.34	₦ 450.88	₦ 112.19	₦ 100.79
Fruits	₦ 112.26	₦ 601.70	₦ 197.44	₦ 148.47
Spaghetti	₦ 250.00	₦ 385.28	₦ 1,300.00	₦ 2,000.00
Noodles	₦ 368.67	₦ 550.00	₦ 1,320.00	₦ 1,650.35
Custard	₦ 180.00	₦ 240.00	₦ 1,400.00	₦ 1,700.00
Bread	₦ 450.00	₦ 830.00	₦ 1,600.00	₦ 2,500.00

Table 3 shows that food expenditure patterns differ across respondents of different weight categories. Nine food groups that were considered include cereals (rice), root and tuber crops (cassava and yam), legumes (beans), animal products (meat and fish), dairy products (milk), fat and oil, vegetables, fruits and processed foods (refined grains e.g. spaghetti, noodles, custard and bread). Overweight and obese respondents consume more fat rich diets than their counterparts as *per capita* monthly expenditure on these food groups was higher for them than their counterparts. Furthermore, it can be deduced from the table that obese respondents purchase larger quantities of certain food categories (fat and oil, dairy products and refined foods) that promote weight gain but spent less on healthy foods like fruits and vegetables.

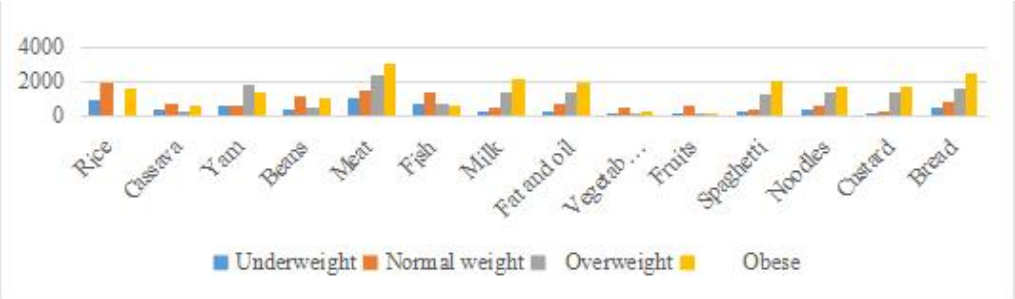

Figure 1: Per capita monthly food expenditure and body mass index of respondents

Figure 1 shows the graphical illustration of the per capita monthly food expenditure on the different food items by the respondents. On the y-axis lies the per capita monthly expenditure in naira while the x-axis shows the different food items. The height of each bar shows the per capita monthly expenditure. It can be seen in the above figure that obese and overweight adults had highest expenditure on food items like meat, bread, fat and oil, spaghetti and noodles that had been identified in the literature as contributors to weight gain compared to normal weight or underweight adults. Also, overweight and obese adults had lower expenditure on fruits and vegetables compared to normal weight adults.

Discussion

Findings from the study showed that the mean age of the respondents across the six agro-ecological zone was 43 years. This implies that the respondents are still physically active and young. This also supports the age distribution of the population in the country where the young dominates the population and the aged constituted the least percentage as documented by the National Bureau of Statistics (NBS, 2017). The highest prevalence of obesity (16.5%) was seen among those in the 31- 60 age group compared to others, this also applies to overweight respondents as well. This conforms to the earlier findings of Hughes *et al.* (2002) where physical activity tends to reduce as age increases. Obesity is more prevalent among women than men. Kassie *et al.* (2020) documented a higher (15%) obesity prevalence rate in Nigeria among adults women aged 18 years and above than men (11%). This may be due to the cultural belief that obesity is a sign of affluence and also as a result of lower level of physically tasking activities among women. However, according to Magemba and Sebastian (2020), marriage and the use of hormonal contraceptives were identified as the major risk factors for overweight and obesity among Zimbabwean women. Married respondents were prone to obesity (19.5%) than the singles (1.3%). This corroborates the findings of Oladapo *et al.* (2010). Adult household members with the highest level of education were more overweight (9.2%) and also obese (6.7%) than others. This is also consistent with earlier findings by Ojofeitimi *et al.* (2007).Considering occupation, the traders were more overweight (11.4%) and obese (8.2%) than those in other occupations. This may be due to the sedentary nature (low physical activity) of their work which has been reported in the literature to be associated with overweight. Studies which documented such findings include (Ogunbode *et al.* 2011). The prevalence of overweight and obesity reduces with income as highest occurrence was seen among respondents that earn less than ₦100,000 monthly. This is in contrast with the findings of Abdulai (2010) where obesity increases with income particularly among women in Nigeria.

Food expenditure pattern shows that obese and overweight adults

consume dairy products (milk) than their counterparts as their *per capita* monthly expenditure was higher. This conforms to the earlier findings of Berkey *et al*. (2005) who reported high consumption of milk and cheese among overweight adults.Additionally, Chukwuonye et al. (2015) reported that sedentary lifestyles, high levels of refined sugar and saturated fats (fast food) and increased dietary consumption of energy-dense foods are some of the primary contributors to the growing incidence of obesity in Nigeria. The chi-square result from the study on the relationship between food expenditure pattern and nutritional status measured through body mass index showed that there is no significant relationship between body mass index and expenditure on rice (χ^2 = 12.000 and p-value = 0.213). This result agrees with the earlier submission of Romling and Qaim (2011) of no relationship between expenditure on cereal products and nutritional status. In addition, the result also showed that there is a significant relationship between body mass index and expenditure on oil and fat foods (χ^2 = 9.316 and p-value = 0.000). This result agrees with the earlier submission of Omage and Omuemu (2018) that found that there exist a relationship between excessive consumption energy-dense food items and overweight. Expenditure on fruit and body mass index was also significant (χ^2 = 7.019 and p-value = 0.001). The above result agrees with that of Amira *et al.* (2011) where diets high in fats and oil were associated with overweight and obesity among adults. Also, Van den Berg *et al.* (2013) reported that consumption of high energy foods at the expense of low energy foods, fruits and vegetables could promote overweight among adults which can further predisposes them to the risk of non-communicable diseases.

Conclusion

The study revealed that body mass index differs significantly among respondents across the agro-ecological zones of Nigeria. The mean body mass index value of 27.17kg/m^2 implies that an average adult is overweight. Overweight and obesity condition increases with age and income, and also more prevalent among female that were mostly into trading as a form of occupation. Specifically, overweight condition is more prevalent among male than female.

The *per capita* spending demonstrates how the monthly food expenditure patterns vary among adults of various nutritional status categories. Furthermore, overweight and obese respondents spend more on animal products, fat and oil and dairy foods that promote weight gain and less on healthy foods (fruits and vegetables) than their counterparts.

Recommendation

Based on the findings from this study, the following recommendations are made:

1. Given the propensity of some social group to be overweight or obese, policy measures should focus on this consumer segment to improve their diet and health awareness.

2. Public awareness should be created among the populace on the implication of being overweight or obese.
3. Government should implement regulations that encourage the consumption of good and healthy foods, perhaps by imposing a fee on unhealthy food items that encourage overweight and obesity.
4. Adults in the household should develop a healthy diet pattern and engaging in regular physical activity.
5. Relevant organisations and non-governmental organisations could help by promoting the sale and supply of fresh food products and also by strengthening the regulations on the use of additives and artificial sweeteners in processed foods.

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