

Original Research Article

**ANALYSIS OF FOOD CONSUMPTION PATTERN
AMONG RURAL FISHERY HOUSEHOLDS: A
PANACEA TO POVERTY ALLEVIATION IN NORTH
CENTRAL NIGERIA**

ABSTRACT

A study was conducted to determine the food and non- food pattern among rural artisanal fishery households in North Central Nigeria. Data used for this study was collected from a total of three hundred and twenty rural fishery households using a multi-stage random sampling technique. The main tools of analysis include descriptive statistics, budget share index and ordinary least square regression model. The study shows that about four-fifth, 77% of total monthly expenditure of fishery households were expended on both stapled and non-stapled food. The left over, 23% comprises of payments for energy, clothing, health, education and others. The results revealed that the average age was 43 years, mean education index of 2.1 years, household size of 8 and adjusted size of 6 and average monthly income of ₦11,350. The empirical results also revealed that adjusted household size (0.138), net fishery income (0.516) and years of schooling (1.53e-05) were factors influencing food consumption among rural fishery households. The study recommends the need to assist fishermen households to improve their fishery practices and diversify their sources of income in order to be able to meet their minimum food requirement especially during the off fishing season.

Keywords: Household expenditure, per adult equivalent, poverty, total monthly income

1. INTRODUCTION

Globally, there are over half a billion small farms and artisanal fishing, and they produce much of the world's food by working 2 ha or less, including much of the food they consumed [1]. However, in a developing country like Nigeria, small scale farmers who constitute the bulks, produce about 85% of Nigeria's total food production. The rural households constitute more than 70% of the country's population, mostly in rural areas, earns their living from these small farms and artisanal fishery. But, ironically the level and incidence of poverty is very pronounced in those areas [2]. As a result of inherent poverty in most of the rural areas, particularly in developing countries, the Millennium Development Goals (MDGs) were established by the United Nations in year 2000 to combat poverty, hunger, disease, illiteracy, gender inequality, environmental degradation and biodiversity.

Investing in fishery is one of the most effective strategies for achieving the goal of halves the proportion of people in poverty and hunger, and achieving critical post-2015 sustainable agricultural development and food production goals related to poverty and hunger, nutrition and health, education, economic and growth, peace and security, and preserving the world's environment [1, 3]. This is because food security, nutrition and health status of fishermen are of great concern in the contemporary world. The fishery households has multiple roles of contributing about 3.5% to the Nigerian country's annual Gross Domestic Product (GDP), employ about 4.3% of Nigeria population and is an important contributor to the population's nutritional requirements, constituting about 50% of animal protein intake [4]. Therefore, fishery households are indispensable towards sustaining agricultural development and feeding an estimated 160 million Nigerians who needed to have an adequate calories and balance nutrients.

Given the sheer size of fishermen and farmers in general in food production, expenditure pattern of fishermen have important implications for nation food self-sufficiency and the sustainable increases in food production and raw material for the agro-food industries not only for Nigeria but also for exports to other countries' food industries. [2] posited that consumption of a household depicts the aggregate demand of goods and services, and the level of welfare and poverty that a household is experiencing. The expenditure pattern of rural households in developing countries has been largely skewed towards food consumption [2], yet rural households that provide the bulks of agricultural products still suffers from caloric and nutrition insufficiencies. This leads to various health problems, which ultimately affects the economic growth and prosperity of a country. [5, 1] observed that the rural households

experienced cycle of seasonal food shortage yearly and that 1996 World Food Summit (WFS) brought to centre stage in the development debate the issue of hunger and food insecurity as both cause and effect of poverty and slow growth. Therefore, this paper provide a micro view of poverty and food security studies with a view to understanding the expenditure pattern of rural artisanal fishery households and its determinants.

2. METHODOLOGY

2.1 Study area

The study was conducted in North Central, Nigeria. The region has six States and FCT Abuja (figure 1) with River Niger flowing along Kwara, Kogi and Niger States and River Benue in Benue State. Kwara State has a land mass covering about 32,500 square kilometres. The State's population and farm families were projected in 2014 to be about 3, 043, 221 and 306, 582 respectively representing 3.2% annual growth rate and an average density of 91 persons/km². However, Niger State has a land mass covering about 76, 000 km² with the State's population and average density/km² projected in 2014 to be about 5, 014, 358 and 66 per persons respectively [6]. Artisanal fisheries production is much favoured in this North Central part of Nigeria as a result of numerous tentacles of inland water and streams as well as flood plains of the River Niger that stretches from Niger State (Borgu LGA) through Kwara State (Edu LGA) to Lokoja/Idah in Kogi State. River Benue also cut across Benue State with prominence in Markudi and adjacent towns in the State. The fishing activities are usually carried out by traditional fishing methods such as canoes with paddlers, gill nets, cast nets, long lines, hook and line sets, traps and outboard engine canoes. The main fish species found in the study area are *clariasanguillaris*, *bariliusniloticus*, *hemichromisfasciatus*, *Synodontisfilamentosa* and *Gymnachusniloticus*.

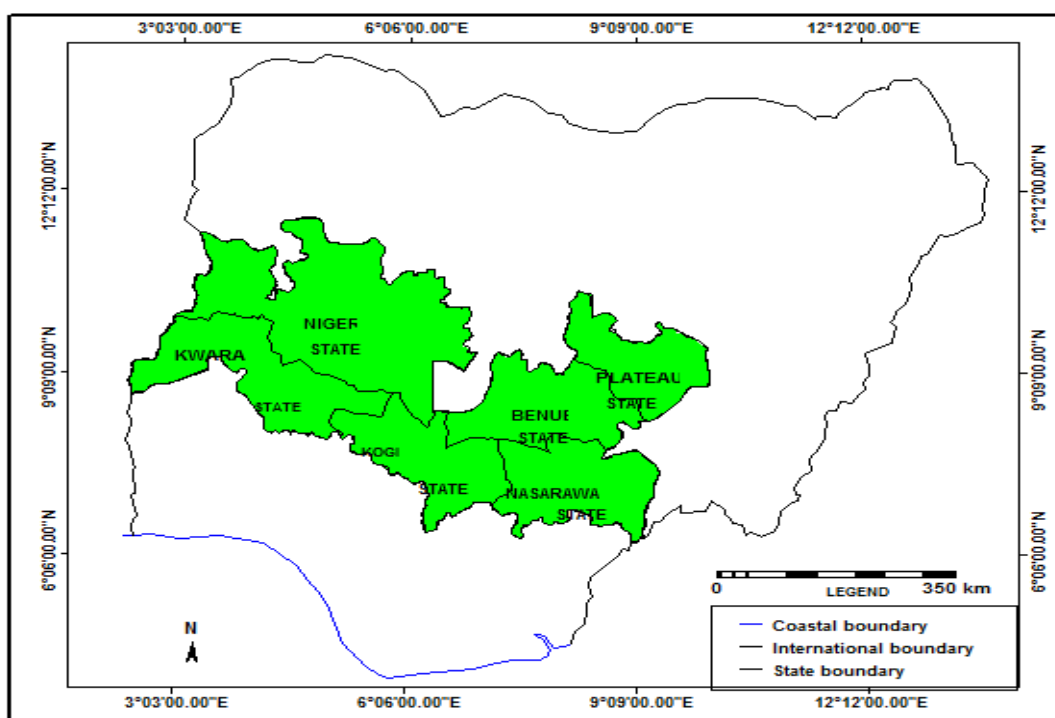


Figure 1: Map of Nigeria showing the position of the North-Central States.

Sources: Adapted and Modified from Administrative map of Nigeria

2.2 Method of Data Collection

The study was conducted between December 2012 and July 2013 in 8 fishing settlements in both Kwara and Niger States, Nigeria. Primary data were collected through interview and structure questionnaire which was subjected to a pre-survey. This was administered to the fishery households randomly selected to generate information on socio-economic and demographic characteristics of households. Information on weekly/monthly household's consumption expenditure on food and non-food items were also collected. Descriptive statistics, budget share and multiple regression models were employed to analyse the data to achieve the objectives of the study.

The sampling procedure was multi-stage random sampling technique. Kwara and Niger States were randomly selected from the list of 6 States in North Central Nigeria. Then, 4 fishing settlements each were randomly selected in chosen States (Figure 1). Finally, with combined efforts of Project staff and 'SarkinRuwa' or village heads, 40 fishery households were randomly selected from each of the fishing settlements making a total of 320 fishery households for the study. The selected fishing settlements were: Yimagi, Tsonga, Ellah, Sunkuso (Kwara State); and Kaya, Garafinikodo, Kokoli, Mago (Niger State).

For this study, expenditure refers to all goods and services for use of fishery households. The components of total expenditure for the rural fishery households were food and non-food items. The major food components for the fishery households reported followed that of Nigerian Bureau of Statistics [2] classification which was assumed to be on seven major groups as follow: Cereals; Root and Tubers; Legumes; Fruits and Vegetables; Animal protein sources; Fats and Oil and other food items. It should be noted that household food consumption covers purchased food and subsistence production by the household itself. The non-food component consists mainly of expenditure on basic household needs such as fuel for cooking, clothing and health. Others include transportation, information technology and communication, and education.

2.3 Analytical Tools

Budget share on the seven classes of food was verified using equation 1 below:

$$w_i = \text{Exp}_i / \text{THE}_a * 100 \quad (1)$$

w_i = budget share of each seven classes of food, and other goods and services; Exp_i = expenditure on each component and THE_a = total adjusted household expenditure

Adult equivalent was generated from Organization for Economic Corporation and Development (OECD) Scale as follows:

$$\text{AE} = 1 + 0.7 (N_{1\text{adult}} - 1) + 0.5 N_{2\text{children}} \quad (2)$$

Where, AE represents adult equivalent, N_1 represents the number of adult aged 15 and above and N_2 is the number of children aged less than 15.

Further, an ordinary least square regression specified in equation 3 was employed to find out the factors influencing food pattern of the artisanal fishery households in North Central Nigeria:

$$\text{LogHc}_i = \beta_0 + \beta_1 \text{LogY}_{fi} + \beta_2 \text{LogHs} + \beta_3 \text{LogE}_d + \beta_4 \text{LogY}_{nfi} + e_i \quad (3)$$

Where: H_c = household expenditure on food items; Y_{fi} = per capita net income; Hs = adjusted household size; E_d = education level of household heads; Y_{nfi} = proportion of non-fishing income β_0 is a constant; β_1 - β_4 are regression parameters that were estimated and e_i = the error term. Note: ₦, Nigeria currency Naira and 1USD (\$) = ₦158 during field survey.

3. RESULTS AND DISCUSSION

3.1 Socio-Economic Characteristics

The results in Table 1 revealed that fishing household heads in the study area were males dominated (90.3%); average age of 43 years and married (94.7%) with mean household size of 8 and adjusted size of 7. The presence of female-headed households in actual fishing was due to death of male heads, migration, divorce or economic reasons. The estimated mean years of schooling of fishery heads were 2 years, largely skewed towards the informal education and fell below 2011 UNDP mean education index of 5 years for Nigeria (Table 1). This reflects a low level of education by fishermen, although an important component of household feature to improve the quality of life.

The average monthly income from fishing summed up to ₦11350 (\$71.84) ranging from ₦2900 (\$18.35) to ₦32500 (\$205.70) per month which show positive contribution to fishery household's welfare. Majority of the pooled fishermen (95.7%) had subsidiary occupations with average yearly off-farm income of ₦8050.50 (\$50.95) ranging from ₦2500 (\$15.82) to ₦49000.80 (\$310.13) per year. This shows that the rural artisanal fishermen have developed capacity to cope with increasing vulnerability associated with fishing such as occupational diversification and migration.

140 **Table 1:** Dominance indicator of some Socio-economic variables of Artisanal Fishermen

Variables	Dominance indicators	Mean	Stddev	CV(%)
Gender (sex)	About 93% were male	-	-	-
Age (yrs)	67% below 51 years	43	9.5	22.1
Marital status	95% were married	-	-	-
Level of Education (years)	66%, no formal schooling	2.1	1.2	57.1
Fishing experience (years)	About 65% had up to 23 years	19.2	11.5	59.9
Household size (persons)	69% had adjusted size of 6-9	7	3.1	38.8
Average income/month (₦)	72% earned < ₦15,000 (\$94.9)	11350	7850.8	69.2
Off-fish income/year (₦)	51% had < ₦20,000 (\$126.58)	8050	1050.5	13.0
Subsidiary occupations	83% engage in farming	-	-	-
Expenditure (₦)	56% below 2/3 monthly	-	-	-

141 *Source:* field survey, 2013;

142 3.2 Expenditure patterns

143 The rural artisanal fishery households' food and non-food expenditure by deciles is presented in Table
 144 2. Throughout the ten deciles, the fishermen households recorded higher values for food expenditure
 145 than the non-food expenditure items. The food poverty line was ₦5900.6 (\$37.35) which account for
 146 about 77% of total expenditure of fishermen's household, while the non-food poverty line equal
 147 ₦1766.6 (\$11.18) and this account for only about 23% of total expenditure. It can be concluded that
 148 the bulk of rural households' expenditure was on food.

149 3.3 Component of Households' Expenditure

150 The result of the analysis of expenditure pattern of respondents in Table 3 indicates the mean per
 151 adult equivalent household expenditure for all household was ₦11500.80 (\$72.79) with standard
 152 deviation of ₦3700.20 (\$23.42). This gives a two third of ₦7667.20 (\$48.53) per adult equivalent per
 153 month which was relative poverty line for rural fishery households. The relative poverty line which was
 154 2/3 per capital expenditure translates to ₦92006.4 (\$582.32) per year and about ₦253 (\$1.60) per day
 155 respectively. More than half, (56%) of sampled fishermen fell below poverty line of ₦7667.2 (\$48.53).

156 **Table 2:** Per adult equivalent of food and non- food expenditure pattern by deciles (₦)

Deciles	Food Expenditure	Non-food	Total Expenditure	Food as % T
First	3482.50(4.13)	776.17(3.21)	4258.67	81.77
Second	3909.33(4.64)	986.67(4.08)	4896.00	79.85
Third	4148.83(4.92)	1120.33(4.63)	5269.16	78.74
Fourth	4500.00(5.33)	1365.00(5.66)	5865.00	76.73
Fifth	4675.00(5.55)	1827.08(7.56)	6502.08	71.90
Sixth	6626.00(7.86)	2415.33(9.99)	9041.33	73.29
Seventh	10116.67(12.01)	2850.00(11.79)	12966.67	78.02
Eight	11275.00(13.80)	3115.00(12.89)	14390.00	78.33
Nine	12186.67(14.46)	3433.33(14.20)	15620.00	78.02
Tenth	23350.00(27.71)	6283.33(25.99)	29633.37	78.02
Total	84270(100)	24172.28(100)	108442.30	77.71
Mean	8850.9	1766.6	10844.30	
Stddev	3700.2	1072.88	7814.85	
2/3MPEHE	5900.6(77)	1766.6(23)		

157 *Source:* field survey, 2013; the figure in parenthesis= % of each component

158 The total expenditure value was disaggregated into food, about 77 %%) and non-food, about 23%.
 159 More than half, 53.4% of the total expenditure was captured by staple food items such as cereals,
 160 root and tubers, legumes, vegetables and animal sources while non-staple food items such as
 161 groundnut oil, salt/potash/seasonings, fruits and beverages consumed about one quarter (23.6%) of
 162 the item of expenditure of the fishermen. Energy in form of fuels for lightening and cooking gulped
 163 only 10.1%. Other items of expenditure include clothing (5.0%); health (4.3%) and others including
 164 education (3.6%). It can be concluded that more than half, 56% of rural households' expenditure were
 165 below the poverty line, which implies that all fishery households whose expenditure is less than the
 166 poverty line were impoverished.

Table 3: Mean household expenditure per adult equivalent

Items	Amount (\$)/AE household/month	Amount(₦)/AE household/month	% Expenditure
Stapled Food	38.87	6141.5	53.4
Non-stapled Food	17.15	2709.4	23.6
Energy	7.40	1168.7	10.1
Clothing	3.64	575.8	5.0
Health	3.11	491.4	4.3
Miscellaneous/Others	2.62	414.0	3.6
Total	72.79	11500.8	100.0
Poverty line (2/3 MHEPAE)	48.53	7667.2	

Source: field survey, 2013

The implication of analysis of expenditure pattern of fishery household shows that in terms of food and non food consumption per adult equivalent, the rural fishery households in Kwara State also had a low level of welfare. This gave an indication that despite their engagement in both secondary and off farm activities; fishery households in the study area were still unable to meet basic food and non-food needs. [5]also posited that hunger and food insecurity as both cause and manifestation of poverty and slow growth.

The rural artisanal fishery households' mean per adult equivalent expenditure disaggregation is presented in Table 4. The result shows that expenditure value had a range of ₦3650.55 (\$23.10) to ₦36900 (\$233.54) per adult equivalent per month with a mean of ₦11500.80 (\$72.79). Fishery households could be classified into different categories suggested by [7]. For example, category with subscript *a* and expenditure range ₦3000-₦5000 (\$18.99-\$31.65) could be classified as extremely poor, *b* as very poor, *c* where poverty line falls as transient poor while expenditure range denote by subscripts *d* and *e* as non-poor.

Alternatively, the expenditure pattern with a poverty threshold of ₦7667.2 (\$48.53) drew a demarcation between poor and non poor. While the poor fishery households were indicated by those below poverty line (about 56%), the non poor could be describe as fishery households above the poverty bench mark (44%). This result established the view of [7] who posited that analysis of poverty status identifies and groups those who experience poverty most intensely, deepen the understanding of poverty and ensure that key groups are not neglected in analysis and action.

Table 4: Distribution of households by mean/ adult equivalent consumption expenditure

Expenditure range (₦)	Expenditure range (\$)	Frequency	Percentage (%)
3001 –5000 ^a	18.99-31.65	22	6.9
5001 – 7000 ^b	31.65-44.30	62	19.4
7001–9000 ^{c*}	44.30-56.96	126	39.4
9001–11000 ^d	56.96-69.62	42	13.1
11001 –13000 ^e	69.62-82.28	37	11.5
Above 13000 ^e	Above 82.28	31	9.7
Total		320	100

Source: field survey, 2013; *Note:* poverty line= ₦7667.2(\$48.53); * =Poverty class interval

3.4 Food consumption pattern

From Table 5, suffice to note that cereals and tubers were responsible for the largest proportion of household expenditure representing 62.1% of food components and 41.3% of total household expenditure. The result corroborates[1] who assert that the developing countries including Nigeria suffers from caloric and nutrient insufficiencies because the bulk of foods consumed weremainly carbohydrates which are obtained mostly in the form of starch.

Further analysis revealed that total protein sources, mainly from legumes and animals in form of fresh and dried fish, beef, mutton, pork and eggs accounted for about 15.1% and 11.7% of food and total fishery households' expenditure respectively. However, the bulks, 79%of the respondents preferred and consumed fish to any other animal protein sources.With an average of 7 members per household, an adult equivalent consumes ₦5,499 (\$34.80) worth of carbohydrate food, ₦1,335.7 (\$8.45) of protein food and ₦708.4 (\$4.48) worth of vitamins. This amounts to an average of

202 ₦8855(\$56.04) worth of food per household member per month in Table 5. It also amounts to an
 203 intake of 80.2% carbohydrate, 11.8% protein and 6% vitamin per household per month.
 204 This harmonized [8, 9] observation that Nigerian average protein consumption from both plant and
 205 animal of 36.6 g per caput consumption per day is less than UN/FAO'S estimated minimum of 75 g of
 206 daily per caput intake. In addition, the contribution of 13.3 g/day from animal source of which fish
 207 products captured 6 g/head/day (about 42%), is below the recommended 35 g/day by the FAO to be
 208 the minimum protein requirement that should be obtained from animal products for the growth and
 209 development of the body.

210 **Table 5: Classifications of food and non food components of fishery households**

Commodities	Average monthly expenditure (₦)	% Food component	% as total expenditure
Cereals	3409.2(\$21.58)	38.5	29.6
Root and Tubers	2631.3(\$16.65)	29.7	22.9
Legumes	512.2(\$3.24)	5.8	4.5
Fruits and Vegetables	531.3(\$3.36)	6.0	4.6
Animal sources	533.5(\$3.38)	6.0	7.2
Fats and Oils	1060.4(\$6.71)	12.0	9.2
Other food items	177.1(\$1.12)	2.0	1.5
Sub-total	8855.0(\$56.04)	100	
Non-food			
Commodities	Average monthly expenditure (₦)	% Non-food	% as total expenditure
Clothing	574.1(\$3.63)	21.7	5.0
Energy	1166.8(\$7.38)	44.1	10.1
Health	489.5(\$3.10)	18.5	4.3
Education	190.5(\$1.20)	7.2	1.7
Transport	105.8(\$0.67)	4.0	0.9
Others	119.1(\$0.75)	4.5	1.0
Sub-total	2645.8 (\$16.75)	100	
Total	11500.8(\$72.79)		

211 **Source:** Field survey, 2013

212 The general livelihood pattern also indicates that fishermen who produce more of the food protein
 213 consumed in the study area sold the bulk of fish harvest in exchange for money to cater for life's basic
 214 needs. This implies that as this trend continues, the fishermen consumed more of the unbalanced
 215 diets which retard growth and productivity, and generally remaining in the ultimate vicious cycle of
 216 poverty.

217 3.5 Regression results

218 Results showed that the hypothesized socio-economic variables in equation5 explained about 62% in
 219 the variations of food commodities consumed by fishery households (Table 6). The result revealed that
 220 food consumption was positively correlated with adjusted household size as hypothesized and
 221 statistically significant at 1% level of probability. This implies that food consumption increase with
 222 increase in household size. These results are in line with findings of [10] that reported that the rate of
 223 increase in food consumption was depended on household size.

224 The net fishery income affected significantly ($p < 0.001$) the consumption of food expenditure
 225 positively. In other words, food consumption of fishery households increases with increase in net
 226 income of rural fishery households, *ceteris paribus*. This implies that a unit increase in fish income
 227 would increase rate of food consumption by 0.51602. This is however expected due to the fact that
 228 the more the fish caught, the higher the income. An increase in income will increase the propensity of
 229 fishermen to increase the expenditure pattern including food consumption. Nevertheless, following
 230 Engel's law the rate of food consumption is mostly likely to increase but at a lesser rate with rise in
 231 income. Thus, higher income tends to bring about welfare improvement hence reduction in poverty
 232 levels. These findings corroborates the findings of [10, 11] in a similar study on food consumption
 233 pattern in Bangladesh and Pakistan respectively, who found that per capita consumption of food
 234 commodities increased with changes in income.

235 Nevertheless, years of formal schooling of household heads had a regression coefficient of 1.53e-05
 236 and statistically significant at ($p < 0.1$) implying that level of education affected household consumption
 237 though marginally in the study area.

Table 6: Factors influencing food consumption among rural fishery households

Variables	Coefficient (β)	Standard Error	t-ratio
Intercept	0.555**	0.264	2.1
Adjusted household size	0.138***	0.020	6.9
Net fishery income	0.51602***	0.09208	5.6
Education level	1.53 e-05*	8.1 e-06	1.9
Non-fish income	14.694 ^{NS}	112.32	0.13
R ² value	0.628		

Source: field survey, 2013; * * * and * were statistically significant at 1% and 10% probability level respectively. R² indicates coefficient of multiple determination

4.0 Policy Recommendations

Nigeria fishery resources are grossly under-utilized, thus there is an enormous potential to increase the output of this sector to raise the income of the fishermen, calorie and nutrition requirements, and improved their welfare. Further, since food demand analysis showed that the fishery households' expenditure were largely on carbohydrate, mostly cereals and tubers, it is imperative to encouraged bulk of the artisanal fishery who engaged in arable farming as subsidiary operation to cultivate these crops.

In addition, there is need for an appropriate policy mix that will promote the increased production of legumes and animal protein foods in the study area. An increase in net fishery income will increase the propensity of fishermen to increase the expenditure pattern including food consumption. Nevertheless, following Engel's law the rate of food consumption is mostly likely to increase but at a lesser rate with rise in income. The remnant income could be converted to durable assets which could easily fall back on, in times of need either by outright sales of these assets or by leasing them. Therefore, policies that would enhance the income generating activities of the rural households in the study area is desirable so as to enhance their food purchasing power, reduce food insecurity and reduce poverty relative to food. Finally, there should be an appropriate policy that would take care of the anticipated changes in the structure of food demand as poor households tends to become non-poor, when their income increase.

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