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Economic Analysis of Fish Demand among Urban Households in Taraba State, Nigeria

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Abstract
This study was carried out to analyze the demand for fish in urban households in Taraba State, Nigeria. The specific objectives were to describe the socio-economic characteristics of respondents, estimate the budget share of urban household fish expenditure, and determine the effect of urban household fish expenditure on the budget share of fish. A multi stage sampling technique was used to select a total of 181 respondents on which questionnaires were administered to elicit relevant information; data collected were analyzed using both descriptive and inferential statistics (budget share index and Almost Ideal Demand System (AIDS) model). The result of the socio-economic characteristics revealed that 38.67% of the respondents were within the age range of 41-50 years with mean age of 55 years, 66.85% of the respondents were male, majority (76.24%) of the respondents were married, with most of them having tertiary education (53.04%). The budget share of fish was 19.11% of the total household food expenditure with meat having a budget share of 13.04% of the household food expenditure followed by the budget share of egg (4.15%). Also, the result of the AIDS model shows that price of fish ($P < 0.01$), price of meat ($P < 0.01$), household size ($P < 0.01$) and household income ($P < 0.01$) all had effect on the budget share of fish among urban households in the study area. The study therefore recommended that credit facilities through banks and other financial institutions should be made available to fish farmers in order to boost fish farming in the study area.

Keywords: AIDS Model, Budget share, Demand, Multi-stage, Taraba

Introduction

Fish is generally believed to be comparatively cheaper and available source of animal protein in most countries around the world especially in Nigeria. Fish has a high nutritive quality and it is significant in improving human health. Fish is one of the most important animal protein foodsavailable in the tropics.Nigerians are high fish consumers with the current consumption figure of about 1.5million metric tons, with annual fish import of about 700,000 metric tons (National Bureau of Statistics (NBS), 2016). The contribution of fisheries to the nation is very significant in term of employment, income generation, poverty alleviation, foreign exchange earnings and provision of raw materials for animal feeds industry.Fish has four major role to play in the economic and welfare value of the nation. These are to increase the supply of protein for domestic consumption, to release labour for industrial output, to increase supply of domestic saving and earn foreign exchange. Fish is important not only for its calorific value but also as an important source of animal protein. Moreover, thousands of Nigerian populace derives their livelihood directly from activities related to fish production, distribution and consumption.In Nigeria, fish, meat and animal products are the fourth most commonly consumed food group (88.9%) by households. Its consumption lags behind grain and flours (97.2%), fat and oil (96.8%) and vegetable (96.7%). Compared to other food groups, average weekly household expenditure was highest for fish, meat and animal products (₦1, 359 per week) (NBS, 2016). A variety of fish products are purchased and consumed across the country. Fish is known to be efficient converter of food for human and saving children from kwashiorkor due to low protein intake and there is little or no religious restriction to its consumption (Dauda *et al.*, 2013).

In Nigeria almost 50% of the total animal protein intake is from fish, it occupies this unique position being the cheapest source of animal protein and it has contributed immensely to the economy as it employs a good percentage of the active labor force in the agricultural sector (NBS, 2016). However, it is worth noting that consumption of fish like other food products is not evenly distributed in Nigeria; Dauda *et al.* (2013)stated that fish consumption in Nigeria is only high in the Southern part of the country but very low in the northern part. Fish supply in Nigeria is either through capture fisheries, fish farming or by importation (Aneneet *al.*, 2010), but unfortunately far above this, half of fish consumed in Nigeria is imported. Nigeria requires about 2.66 million of fish annually to satisfy the dietary requirement of its citizens (160 Million). Regrettably, the total aggregate domestic fish supply from all sources (capture and culture fisheries) is less than 0.7 million Mt per annum. Nigeria has to import about 0.7 million Mt of fish valued at about USD 500 million annually to augment the shortfall (Atanda, 2012). This massive importation of frozen fish in the country has ranked Nigeria the largest importer of frozen fish in Africa (Atanda, 2012). Frozen fish importation in Nigeria may still continue for some time because supply from captured fisheries in Nigeria has been erratic and on the decline in recent yearsand the growth rate in aquaculture is not yet sufficient for the ever increasing demand.This study therefore seeks to provide answers to the following research questions; what are the socio-economic characteristics of urban households in the study area? What is the budget share of urban household fish expenditure and what is the effect of urban household fish expenditure on the budget share of fish.

Methodology

The Study Area: The study was conducted in Taraba State, Nigeria. It is one of the 36 States of the country created on 27th August, 1991 with 16 local government areas, located between latitude $7^0\,59^1$N and longitude $10^0\,58^1$E and occupies a total landmass of about 54,428km^2, which is the 3rd largest State in the country in terms of landmass (Taraba State Government, 2009). The state has an estimated human population of 2,294,800, which was projected to be about 3,038,315 in 2018 with an annual growth rate of 2.7% (NBS, 2016). The state is bordered to the east by Adamawa State, to the north by Gombe, Bauchi and Plateau States, to the west by Nassarawa and Benue States and the Republic of Cameroon to the south.

Sampling Techniques: A multi-stage sampling technique was used for this study. The first stage involved random selection of one (1) local government from each of the three zones; the second stage involved random selection of one (1) district from the selected local government; the third stage involved random selection of two (2) communities from the selected district to make a total of six (6) communities while in the final stage, ten percent (10%) of the population size was used to obtain a representative sample of 181 respondents.

Data collection and analytical techniques: Primary data was used for this study. A well-structured questionnairewas used to elicit necessary information from the respondents. The questionnaire was pre-tested to ensure its validity and reliability for the research. Both descriptive and inferential statistics (budget share index and Almost Ideal Demand System (AIDS) model) were used to analyze the data in line with the stated objectives of the study.

Model Specification

Budget Share Index: The budget share index was used to estimate the budget share of urban household fish expenditure of urban households and it is expressed as:

$$Wf = \sum \frac{Xfi}{Xi} \qquad (1)$$

Where:W_F = Budget share on fish by ith household, X_{Fi} = Expenditure on fish by ith household (₦/month), X_i = Expenditure on all food items consumed by household (₦/month) and i = 1, 2..... n. (n = total number of respondents).

Almost Ideal Demand System (AIDS) model: The AIDS model was used to determine the effect of urban household fish expenditure on the budget share of fish as adopted by Tsegai and Kormawa (2002); Adetunji and Rauf (2012) and Oyinbo *et al.* (2013). The model is expressed as:

$$Wi = ai + \sum_{j=1}^{n} \gamma ij \ln(Pi) + \beta i \ln(\tfrac{x}{p}) + \sum_{j=1}^{n} \delta ij\, Zi + ei \qquad (2)$$

Where: W_i = budget share of commodity i, P_i = price of commodity, X = total expenditure on all the commodities within the system, n = number of commodities, ln = natural logarithm, a_i* = constant term in the ith share equation, p = stone's price index given as $\sum W_i (\ln P_i)$,γ_{ij}= slope coefficient associated with the jth commodity in the ith share

equation, β_i = expenditure coefficient of j^{th} commodity in the i^{th} share equation, Z_j = the demographic variables of which there are n in number, δ_{ij} = the vector of parameters, and e_i = error term. The explicit form of the demand equations are given as:

$$W_F = a_1^* + \gamma_{11} \ln P_F + \gamma_{12} \ln P_M + \gamma_{13} \ln P_E + \beta_1 \ln (X/P_F) + \delta_{11}Z_1 + \delta_{12} Z_2 + \delta_{13} Z_3 + \delta_{14}Z_4 + e_1 \quad (3)$$

$$W_M = a_2^* + \gamma_{21} \ln P_M + \gamma_{22} \ln P_F + \gamma_{23} \ln P_E + \beta_2 \ln (X/P_M) + \delta_{21}Z_1 + \delta_{22} Z_2 + \delta_{23} Z_3 + \delta_{24}Z_4 + e_2 \quad (4)$$

$$W_E = a_3^* + \gamma_{31} \ln P_E + \gamma_{32} \ln P_F + \gamma_{33} \ln P_M + \beta_3 \ln (X/P_E) + \delta_{31}Z_1 + \delta_{32} Z_2 + \delta_{33} Z_3 + \delta_{34}Z_4 + e_3 \quad (5)$$

Where: W_F = household budget share on fish, W_M = household budget share on meat, W_E = household budget share on egg, P_F = price of fish (₦/kg), P_M = price of meat (₦/kg), P_E = price of egg (₦/kg), Z_1= age of household head (years), Z_2= educational level of household head (number of years of schooling), Z_3 = household size (number of household members), Z_4 = household income (₦/month), X = total household expenditure on all the food items within the system (₦), P = stone's price index, $\gamma_{11} - \gamma_{33}$= price coefficients or the slope coefficients in the share equations of fish, meat and egg respectively, $\beta_1 - \beta_3$ = expenditure coefficients of fish, meat and egg respectively, $a_1^* - a_3^*$ = constant terms in the share equations of fish, meat and egg respectively, $e_1 - e_3$ = error terms in the share equations of fish, meat and egg respectively, and $\delta_1 - \delta_3$ = coefficients of demographic variables in the share equations of fish, meat and egg respectively.

Results and discussion

Socioeconomic Characteristics of Urban Household: the socio-economic characteristics of urban household presented in Table 1 revealed that 38.67% of the respondents were within the age range from 41-50 years with mean age of 55 years. The results depicts that the urban households were within the active age group of productive activities. The study also showed that 66.85% of the respondents were male, implying that men dominated the urban households in the sampled communities. Also, the result indicated that majority (76.24%) of the respondents were married, with most of them having tertiary education (53.04%) and average income of₦65,494 per month. This result is in line with the findings of Dauda *et al.*, (2016) who found that the socioeconomics characteristics of sampled fish consumers indicated 65% male with majority (62.9%) between the ages of 31 and 50 years; with 70% having tertiary education and 57.3% married.

Budget Share of Household Fish Expenditure: household expenditure on food is influenced by some factors which include price, availability, income, taste and preference. These factors contribute significantly to the variations in the budget share of food and food expenditure among households. The results of budget share of household food expenditure as presented in Table 2 shows that the average budget share of food items considered varies considerably. The budget share of fish was 19.11% of the total household food expenditure with meat having a budget share of 13.04% of the household food expenditure followed by the budget share of egg (4.15%), which is very low; therefore implying that the households do not consider egg as part of their major protein source. This implies that the urban households in the sampled communities spend considerable amount of the household food expenditure of fish and meat as the major protein sources. This result is in line with the findings of Amao*et al.*, (2016) who studied economics of fish demand in Lagos State and observed that as income of household increases, they tend to increase their budget share of fish in the study area.

Effect of Household Fish Expenditure on the Budget Share of fish: the results of the estimated parameters of the Almost Ideal Demand System (AIDS) model are presented in Table 3. The dependent variables Wf, Wm and We are the expenditure shares of fish, meat and egg respectively while the independent variables are the natural logarithm of price of fish, meat and egg (LnPf, LnPm and LnPe), the logarithm of total expenditure deflated by the stone price index for fish, meat and egg (LnXPf, LnXPm and LnXPe), age (Z_1), educational status (Z_2), household size (Z_3) and household income (Z_4).

The results revealed that the coefficient of price of fish (0.7796) was positively related to the budget share of fish while the coefficient of price of meat (-0.4574) was negatively related to the budget share of fish and were both statistically significant at 0.01 probability level ($P < 0.01$). This implies that as the price of fish increased, the household also increased the budget share of fish and vice versa. Also, as the price of meat increased, the urban household decreased the budget share of meat and vice versa. The implication of the finding is that an increase in the price of fish by a unit led to an increase in the budget share of fish by 0.7796 units while a unit increase in the price of meat led to 0.4574 units decrease in the budget share of meat. This is in line with the finding of Inyang and Onu (2018) who found that the coefficient of price of fish was positively related to the budget share and stated that this may be due to limited substitutes for fish such that even if price is higher, household will continue to buy fish. Also, the coefficient of household size (0.2916) and household income

(0.0418) were both positively related to the budget share of fish and statistically significant at 0.01 probability level ($P < 0.01$). This is a direct relationship, which means that an increase in these variables will increase the budget share of fish and vice versa. The implication of this finding is that a unit increase in urban household led to 0.2916 unit increase in the budget share of fish and vice versa while a unit increase in household income led to 0.0418 unit increase in the budget share of fish and vice versa. This finding corroborates the assertion of Ezedinma*et al.* (2006) that urban household demand for meat will continue to increase as incomes increases and vice versa.

Conclusion and recommendations

This study was carried out to analyze the demand for fish in urban household in Taraba State; it therefore concludes that urban households in the sampled communities spend considerable amount of the household food expenditure on fish and meat as the major protein sources. The estimated parameters of the AIDS model revealed that as the price of fish increased, the household also increased the budget share of fish and vice versa, as the price of meat increased, the urban household decreased the budget share of fish and vice versa.

It was recommended that credit facilities through banks and other financial institutions should be made available to fish farmers with simplified procedures in order to boost fish farming in the study area.

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Table 1: Socioeconomic characteristics of urban household

Variables	Frequency	Percentage	Mean

Age (Years)			
≤ 40	2	1.10	
41 – 50	70	38.67	55years
51 – 60	55	30.39	
61 – 70	42	23.21	
> 70	12	6.63	
Gender			
Male	121	66.85	
Female	60	33.15	
Marital Status			
Single	25	13.81	
Married	138	76.24	
Divorced	18	9.94	
Educational Level			
No Formal	2	1.10	
Primary	7	3.87	
Secondary	76	41.99	
Tertiary	96	53.04	
Income (₦)			
≤ 40,000	34	18.78	
41,000 – 80,000	116	64.09	₦65,494.48
81,000 – 120,000	29	16.03	
> 120,000	2	1.10	

Source: Data Analysis, 2019.

Table 2: Budget share of household food expenditure

Food Items	Expenditure (₦)	Budget Share
Fish	766,000	0.191118 (19.11)
Meat	522,500	0.130364 (13.04)
Egg	166,300	0.041492 (4.15)

Source: Data Analysis, 2019. Figures in Parenthesis are in Percentages

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Table 3: Regression Estimates from the AIDS Model

Variables	Wf	Wm	We
Constant	-1.0471 (0.42)	0.4176 (0.27)	0.0158 (0.08)
LnPf	0.7796 (4.12)***	0.0668 (0.57)	-0.0086 (0.61)
LnPm	-0.4574 (3.15)***	-0.2916 (2.83)***	-0.0001 (0.01)
LnPe	0.0255 (0.30)	0.0115 (0.21)	0.0313 (4.82)***
LnXPf	-0.0000 (1.28)	-0.0000 (1.11)	-0.0003 (1.85)*
LnXPm	-0.0000 (0.60)	0.0000 (0.53)	0.0000 (1.03)
LnXpe	0.0006 (0.78)	0.0000 (0.85)	-0.0000 (1.17)
Z_1	-0.0381 (1.36)	-0.0489 (2.78)***	-0.0060(2.80)***
Z_2	0.0376 (0.46)	0.0571 (1.12)	0.0116 (1.88)*
Z_3	0.2916 (2.83)***	0.3156 (4.92)***	0.0418 (5.40)***
Z_4	0.0418 (5.40)***	0.0000 (0.32)	-0.0000 (0.07)
R^2	0.6590	0.6780	0.7975

Source: Data Analysis, 2019.***, ** and * represents significance at 1%, 5% and 10% respectively.

Identification of improved varieties	10 (6.9)	20(13.9)	60 (41.7)	54(37.5)	156	3.23	7th	Relevant
Chemical weeds control	6 (4.2)	12(8.2)	66 (45.8)	60(41.7)	468	3.25	6th	Relevant
Selection & method of fertilizer application	19 (13.2)	30(20.8)	59 (41.0)	36(25.0)	400	2.78	11th	Relevant
Pests and disease control	2 (1.4)	8(5.6)	66 (45.8)	68(47.2)	488	3.39	3rd	Relevant
Harvesting and processing techniques	14 (9.7)	23(16.0)	64 (44.4)	43(29.9)	424	2.94	9th	Relevant
Grain treatment	10 (6.9)	14(9.7)	78 (54.2)	42(29.2)	443	3.08	8th	Relevant
Modern storage technique	24 (16.7)	16(11.1)	64 (44.4)	40(27.8)	403	2.80	10th	Relevant

Source: Field Survey, 2016.Figures in parentheses are percentages, while Sw= Weighted Sum and $\bar{X}w$ =Weighted Mean Score

Table3: Distribution of Respondents based on their views of Role FFS training played on their Cowpea Yield

Response	Frequency	Percentage
Very good increase	35	24.3
Good increase	83	57.6
Slight increase	25	17.4
No increase	1	0.7
Total	**144**	**100**

Source: Field Survey, 2016

Table4: Correlation test of relationship between selected socio-economic characteristics & training Received

Variable	Correlation coefficient (r)	p-value
Age	-0.218**	0.031
Household size	0.185**	0.040
Educational level	0.216***	0.001
Farming experience	0.040***	0.003
Marital status	0209**	0.014

Source: Field Survey, 2016

Table 5: Respondents' Perceived Constraints to participation in FFS training

Constraints	Mean score ($\bar{X}$)	Decision
Improper training time schedule	2.92	Severe
Conservative attitudes of the farmers	2.81	Severe
High level of illiteracy among the farmers	2.90	Severe
ıadequate training infrastructure	2.81	Severe
Bad rural access roads	3.24	Severe
Training too technical	2.37	Not Severe
Unethical job attitude of facilitators	1.76	Not Severe

Source: Field Survey, 2016