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Fish Preferences and Demand Elasticities among Households in Umuahia Metropolis of Abia State, Nigeria

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Abstract
This study analyzed fish preferences and demand elasticities among households in Umuahia metropolis of Abia State, Nigeria. Specifically, the study ascertained the frequency and pattern of consumption of fish, estimated the factors that influence quantity of fish consumed and estimated own price, cross price and income elasticities for fish in the study area. Primary data were collected from a total of 80 fish consumers using simple random sampling technique. The data were analyzed using descriptive and inferential statistics. Among the four functional forms (linear, exponential, double and semi-log) used for estimating the demand for fish among the consumers in the study area, the linear functional form was chosen as the lead equation based on econometric and statistical reasons such as the number of regression coefficients that are significant (the value of R^2 (0.9732) and the significant level of F-ratio (157.86) which is significant at 1.0 alpha level ($P<0.01$)). It was also evident from the study that the higher the income level of the respondents, the higher the expenditure on fish and fish demand also increases as household size and level of education increases. The result of price and income elasticity of demand revealed that fish is relatively elastic to changes in income and price. The consumers were dominated by low to medium income earners majorly civil servants who had formal education. Since most consumers preferred the commodity (fish), the productivity and availability should be ensured to guarantee food security.

Keywords: Fish Preferences, Demand Elasticities, Households, Umuahia Metropolis, Abia state, Nigeria

Introduction

Animal protein sources such as beef, pork, mutton and chicken are beyond the reach of a low income earner (Ikechi and Ezihuo, 2021), hence many people resort to fish, as a cheap source of animal protein. The demand for fish globally and particularly in Nigeria has been on the increase with supply not meeting up with demand (FAO, 2019). Current projected fish demand in Nigeria is estimated at 2.66 million tons (Edet *et al.,* 2018). However, data on domestic fish supply in the country showed that average domestic supply of fish was 620,000 tons which were augmented by fish importation of about 740,000 tons valued at US $ 594.4 million hence leaving a deficit of 1.3 million tons (Onyekuru, Okorie, Ugwu and Nwokorie, 2020). Oladimeji (2017) reported that fish constitute 40.0% of protein intake of the average Nigerian and also provides employment opportunities to many rural dwellers in different fields of fishery activities such as production, processing, preservation, marketing and transportation.

Fish and fish products are known world-wide as a very important diet because of their high nutritive quality and significance in improving human health. Over the past 15 years, fish has enjoyed an explosive increase in demand, a demand that has also boosted its price (Onyeneke and Nwawu, 2018). There is heightened awareness in the developed world of the nutritional and health benefit of fish products, low in fat and calories and high in protein, vitamins, minerals and poly unsaturated fatty acids (Adeniyi *et al,* 2018).

Demand is an increasing function of income and a decreasing function of price. Consumers will arrange consumption in such a way that the marginal utility derived from each commodity is proportional to price. Other factors that affect demand are; the stock of past assets and expectations of price rising. Relative small changes in food prices affect the ability of consumers to meet basic nutritional requirements (Amao *et al.*, 2016). However, the impact of these changes on demand/consumption differs among income groups. FAO (2017) study on future demand for the supply of fish and fishery products predicted a sizeable increase in demand for fish. The majority of this increase will result from expected economic development, population growth and changes in food habits. Supply from capture fisheries is expected to remain constant, or even to decline (FAO, 2016). Indeed, fish supply from the capture fisheries in most countries is believed to have reached or be close to the maximum sustainable yield.

In a meeting of the African Regional Nutrition strategy in 1993, Nigeria was included as one of the countries having the lowest daily per capita supplies of between 70-90 percent of nutrition requirements. According to Dalhatu and Ala (2018), protein for human consumption comes from two main sources, namely: plants and animals. Plant proteins are deficient in certain essential amino acids notably methionine, tryptophan and lysine which are essential for healthy growth. However, animal proteins are rich in these amino acids and are therefore described as first class or good quality protein (Olayide and Olayemi, 2020). In recent years, increased knowledge and awareness of human nutritional requirements for healthy growth have focused increasing attention on the unique roles of livestock and fisheries resources in human development (CBN, 2002).

In developing countries, fish is a highly acceptable food that supplies as much as 40.0% of all animal protein especially in countries where fish is the main source of animal protein (Igwe and Onyekwere, 2020). According to Alexandratos (2019), the ever-increasing share of fish in total protein supply implies that fish has become more and more important in people's diet. A research into the problem on nutrition reveals that many people in the developing countries of the world are under-nourished at least five out of nine persons (FAO, 2019). Despite all development programmes on food accessibility and availability carried out by the Nigerian government, hunger and malnutrition still exists in most part of the country.

In spite of the numerous natural and human resources at her disposal, Nigeria still remains amongst the least consumers of protein in Africa (Andrew, 2020). Bessler (2002), observed that the protein intake by Nigerians is about 6.0 g to 8.4g/head/day of animal origin. Fish contribution of less than 3.6gm per day of net protein utilization in Nigerian homes is still below the recommended requirement of 35g by the world Health Organization (WHO, 2021). The short fall is not because of the non-availability of the resource but due to none maximization and sustainable utilization of available aquatic resources. Nigeria has over 12.5 million hectare of inland water capable of producing over 350,000 metric tons of fish annually. Ahmed and Krishea (2020) stressed that protein and calorie malnutrition or shortage in ingested foods resultantly impedes health, working efficiency and overall economic progress.

FAO (2015) pointed out that Nigeria with extensive mangrove ecosystem should be able to achieve sufficient and sustainable fish output to meet domestic demand. For instant large populations of Nigerians are fish consumers with a demand estimated at more than 1.4 million tons annually out of which domestic production make up only 700,000 tons, which constitutes 50.0% of the total demand. This situation and neglect of aquaculture and inland fisheries development over the years have made Nigeria to become one of the largest fish importers (some 700,000 tons per year) in Africa, with cost on the country of more than $US 2 billion every five years as payment for imported fish (Jim and Tunde, 2021). The aim of the study is therefore to analyze fish preferences

and demand elasticities among households in Umuahia metropolis of Abia State, Nigeria

Based on the foregoing, the study intended to: (i) estimate factors influencing preference for fish; (ii) estimate factors that influence quantity of fish consumed; (iii) estimate own price, cross price and income elasticities for fish in the study area.

Research Hypothesis

The following hypothesis in the null form was tested.

Ho_1: There is no significant relationship between selected socio-economic variables (own price, monthly Income, education level, age, gender, primary occupation, price of substitute, household size, marital status) and quantity of fish demanded.

Materials and Methods

Study Area

The study was carried out in Umuahia metropolis. Umuahia is the capital of Abia State, located in the South East geo-political zone of Nigeria. The choice of the study area is informed by the presence of notable markets where fish of various species are sold. Umuahia capital territory which comprises Umuahia North and Umuahia South according to NPC (2016) have a population of 426,803 persons, made up of 225,190 males and 201,613 females, with a land mass of 967,193 square kilometer. Umuahia capital territory is bounded in the North by Isiukwuato L.G.A, South by Isialangwa North L.G.A, to the east by Ikwuano L.G.A and to the West by Obowo L.G.A in Imo State and it has five notable clans, which are Ibeku, Ohuhu, Olokoro, Umuokpara and Ubakala, 84 autonomous communities and 33 political wards. It lies between latitudes $5^{\circ}30^{'}$ N and $5^{\circ}40^{'}$ North of the equator and longitudes $7^{\circ}25^{'}$ E and $7^{\circ}32^{1}$ East of the Greenwich meridian (Figure 1).

The area falls within the rain forest zone of Nigeria with its attendant dry and rainy seasons. The rainy season last from April to October, while the dry season lasts from November to March, with January to March as the hottest months of the year, while July to September records the highest rain peak period (Phil-Eze, 2001). Umuahia Capital Territory lies within the rainforest climatic zone with average rainfall of 2,169mm and an elevation of about 122 meters above sea level. The mean minimum and maximum temperatures are 23.0°c and 31.0°c respectively and relative humidity ranging from 66.0% - 70.0% (Anyadike, 2002).

The inhabitants of Umuahia metropolis comprise civil servants, traders and farmers. The farmers usually grow food crops such as yam, cocoyam, maize, vegetables, cassava, melon, pepper etc, cash crops such as oil palm and cocoa are also available in the L.G.A. The livestock kept include Goat, sheep, pigs and poultry.

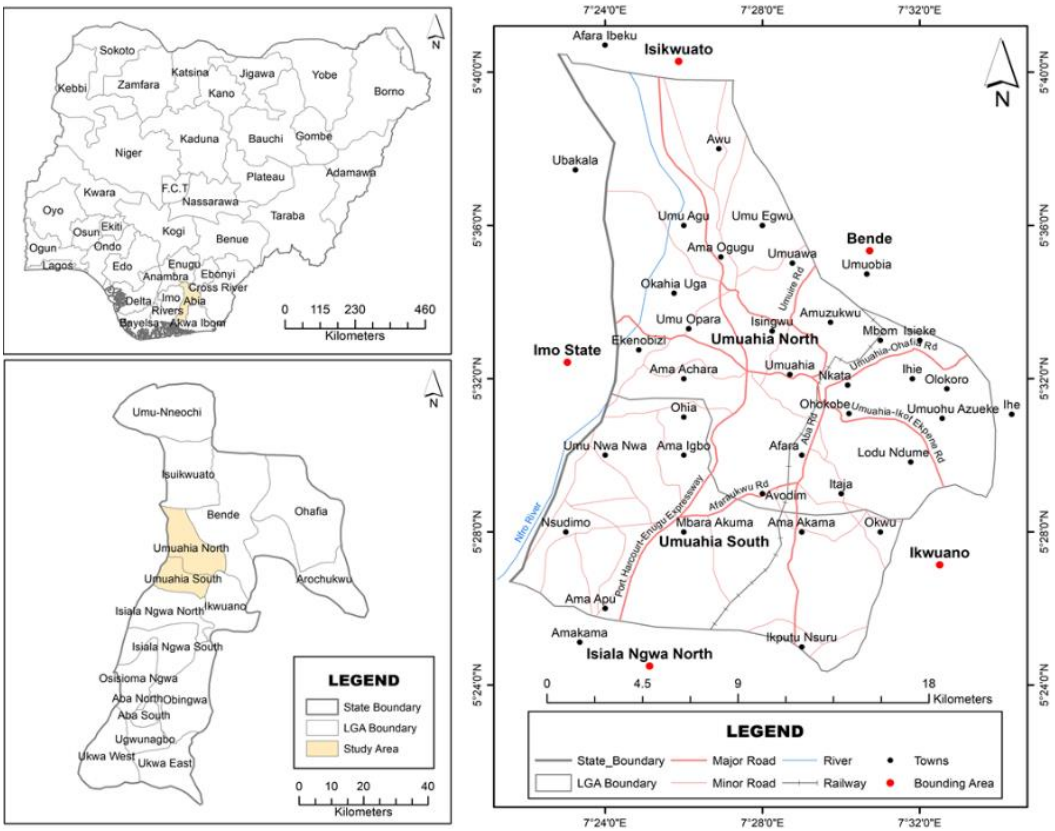

Figure 1: The Study Area
Source: Survey Department, Ministry of Land and Urban Development Abia State.

Method of data collection

The Data set for this study was obtained mainly from primary source. The data set was a cross-sectional type obtained through a set of structured questionnaire which was administered to the respondents. The study employed the multistage sampling technique. In the first stage, 2(two) autonomous communities were randomly selected from each of the two local government areas in Umuahia Capital territory, making a total of 4(four) authonomous communities. In the second stage, 20 households were randomly selected from each of the 4(four) autonomous communities. From each household one member was selected. This gave a sample size of 80.

Data analysis

The data were analyzed using descriptive and inferential statistics. Objectives (i) was analyzed using logit regression analysis. Objective (ii) and (iii) were achieved with the aid of multiple regression analysis and Elasticity parameters respectively.

The logit model is specified below.
The binary Logit for the estimation of the consumer preference is stated thus:

$Z_1 = b_0 + b_1X_1 + b_2X_2 + \ldots\ldots b_6X_6$ .....(1)

Where

Z_1= Preference for fish (Dummy: 1= Preference for fish, 0= Otherwise)
X_1= Price of fish type (₦)
X_2= Type of fish (Dummy: 1= frozen fish, 0= Otherwise)
X_3= Age of consumers (years)
X_4= Number of years spent in school

X_5= Income of the consumer per month (₦)
X_6= Gender of consumer (Dummy: Male= 1, Female= 0)
B_0, b_1- b_6 = Coefficients to be estimated
The implicit function for the regression analysis is presented in equation (1)

Y	=	$f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, e_i)$ ……. (1)
Y	=	quantity of fish demanded/consumed
X_1	=	average monthly income of respondents
X_2	=	own price
X_3	=	household size
X_4	=	gender of respondents
X_5	=	marital status
X_6	=	primary occupation of respondents
X_7	=	educational level of respondents
X_8	=	Age of respondents
e_i	=	Error term

The four functional forms of the model (Linear, exponential, double log and semi-log) were fitted to the data. The lead equation was selected based on statistical and econometric reasons such as number of significant variables, magnitude of the F. ratio and R^2, and the conformity of the variables to apriori expectation. The four functional forms are as stated below.

Linear function:

$$Y = b_o + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + ei$$

Semi – log function

$$Y = b_o + b_1\log x_1 + b_2\log x_2 + b_3\log x_3 + b_4\log x_4 + b_5\log x_5 + b_6\log x_6 + b_7\log x_7 + b_8\log x_{8+} e_i$$

Double log function

$$\text{Log } Y = b_o + b_1\log x_1 + b_2\log x_2 + b_3\log x_3 + b_4\log x_4 + b_5\log x_5 + b_6\log x_6 + b_7\log x_7 + b_8\log x_{8+} e_i$$

Exponential Function

$$\text{Log } Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + b_7x_7 + b_8x_8 + ei.$$

The own price elasticity is stated thus:

$$ep = \frac{\partial Q}{\partial P} \times \frac{P}{Q} \qquad (2)$$

Where: *ep* = price elasticity

$\frac{\partial Q}{\partial P}$ is slope of the linear demand curve

Q is quantity demanded
P is price of commodity.

The cross price elasticity is stated thus:

$$Exy = \frac{\partial Qx}{\partial Py} \times \frac{Py}{Qx} \qquad (3)$$

Where:

Exy = cross elasticity of commodity *x* with regard to commodity *y*
Qx = Quantity demanded of commodity *x* [fish]
Py = price of commodity *y* [meat]

The income elasticity is specified as

$$\frac{\partial Q}{\partial Y} \times \frac{Y}{Q} \quad (4)$$

Where

Q = quantity of the goods demanded
Y = Consumers income

Results and Discussion

Factors influencing Preference for fish in the study area

The logistic binary regression results indicating the determinants of preferences to fish types in Umuahia Metropolis of Abia State, Nigeria was shown in Table 1. The result shows that three variables (fish type(X_2), age of consumers (X_3) and monthly income (X_5)), made positive contributions to the equation. This implies that as the values of these variables increases, the tendency of the consumers to consume fish increases. The fish type coefficient (8.112) exerted a positive and significant impact on preference for fresh fish in the study area. This is expected because there is a very little inhibition both customary and religious barring the consumers from fresh fish consumption.

The coefficient of price of fish (2.035) made positive contributions on preference and was statistically significant at 1.0% alpha levels. This is in agreement with normal expectation that consumers at times evaluate the quality of food products by their price. The coefficient of monthly income (0.800) was positive and statistically significant at 1.0% alpha level. This result is consistent with the findings of Kotler and Armstrong (2021) and Kotler and Keller (2020) assertion that a consumer's economic situation affects his product choice. Theory had it that where a consumers' income increases, his tastes and preferences changes which translate into improvement in his standard of living. The positive sign for income also correlates with the findings of Umberger *et al* (2003) and Chimboza and Mutandwa (2009) who found that wealthier consumers tend to use the price as an indicator of quality. Fish are believed to be higher in quality and as such command premium price.

The Cox-snell and Nagelkerke R^2 values are attempts to provide a logistic analogy to coefficient of multiple determination (R^2) in regression. The Nagelkerke measure adapts the cox-snell measure so that it varies from 0 to 1 as does the R^2 in the regression. At 62.2% and 74.8% for cox-snell and Nagelkerke respectively, the regression line fits the data as appreciably high and acceptable level and as such, implying the extent of explanation of variations in the dependent variables. This result consolidates the findings of Nwachukwu *et al* (2008) who had almost similar outcomes.

Table 1: Determinants of Fish Preferences in Umuahia Metropolis of Abia State, Nigeria

Variables	Coefficient (B)	Standard error	Wald	Exp. (B)
Constant	2.11	2.050	2.00	8.257**
Price of fish (X_1)	2.035	1.058	3.001	0.966***
Fish type (X_2)	8.112	0.485	4.054	1.119***
Age of consumers (X_3)	0.021	0.015	1.389	0.979
Years spent in school(X_4)	0.002	0.003	0.384	0.998
Monthly income(X_5)	0.800	0.000	3.163	1.000***
Sex (X_6)	0.110	0.434	0.492	0.738
Cox and Snell R^2	0.622			
Nagel Kerke R^2	0.748			
Log Likelihood	127.558			

***; ** Denote Statistical Significance at 1.0% and 5.0% risk level
Source: Field Survey Data, 2021

Determinants of quantities of fish demanded by consumers

The multiple regression estimates of the factors that influenced the monthly quantity of fish demanded among rural households in Umuahia Metropolis were shown in Table 2. The table shows that three of the estimated functions were significant ($P < 0.01$). This implies that three of the functional forms were adequate in explaining the variations in the dependent variables. However, among the three functional forms (Linear, Exponential and Semi-Log). The linear functional form was chosen as the lead equation based on econometric and statistical reasons such as the number of regression coefficients that are significant, the value of R^2 (0.9732) and the significant level of F-ratio (157.86) which is significant at 1.0 alpha level ($P < 0.01$). Educational level had a significant positive effect (2.4358) on the amount of fish demanded in the study area at 5.0% significant level. Over 90.0% of the respondents had some levels of formal education.

Specifically, household size was directly related to the quantity of fish demanded by the consumers. The coefficient was 5153.099, while the t-value was 2.4814 and the variable is statistically significant at 5.0% probability level. Expectedly, consumers with large household size were likely to demand greater quantities of fish – and other basic household requirement. Although, Christianity restricts the number of wives in the household, many low income household sizes were relatively large. This situation has posed serious problems in recent times, due to the present economic crises and is responsible for the high rate of malnutrition, illiteracy and unemployment, especially in the rural economy (Okorji, 1999; Ezeh, 2020).

Monthly income of the consumers had (37786.05 as the coefficient) the expected positive correlation with quantities of fish consumed in the area. It was also statistically significant at 1.0 percent level of probability. These results suggest that income is a significant determinant of fish consumption and that increase in income of consumers leads to increase in the quantities of fish demanded in the study area. It further implies that in the study area, fish is a normal goods. This result is consistent with the findings of Gbigbi, (2021) in the nearby Delta State; Fabiyi (1985) in Cross River State, of Nigeria and Schrimper (1986) in U.S.A. The price of fish made marginal contribution to the equation. The coefficient (369.0792) was positive with a t-value of 2.113 which is statistically significant at 5.0 percent risk level. The sign of the variable was not in conformity with *a priori* expectation in that an increase in own price of fish increases the quantity demand of fish in the area. It also implied that higher price would cause the consumer to demand greater quantities of fish. This result could

be as a result of expectation of future rise in the price of fish.

Table 2: Estimates of Factors that Influenced quantity of fish consumed in Umuahia Metropolis of Abia State, Nigeria

Variable	Linear+	Functional Forms Exponential	Semi-Log	Double -log
Constant	-34071.07**	9.509219***	-1335745***	-1.148513
	(-2.4615)	(35.9137)	(-11.9294)	(-1.5069)
Age	0.249	0.0052527*	33309.18	0.3175912*
	(0.896)	(1.7280)	(1.2764)	(1.7880)
Educational level	6227.075**	0.1041091*	9618.688	0.0788798
	(2.4358)	(2.1288)	(0.8643)	(1.0412)
Household size	5153.099**	0.0964482	-9185.519	0.0490681
	(2.4814)	(2.4278)	(-0.8827)	(0.6927)
Monthly income	37786.05***	0.1239809***	-20222.41*	0.018234
	(6.9168)	(3.1334)	(-2.0169)	(0.2671)
Price of fish	369.0792**	0.0015186	-18485.73*	-0.0705021
	(2.113)	(0.4545)	(-1.8047)	(-1.0112)
	0.9732	0.8472	0.9520	0.9414
Adjusted R^2	0.9598	0.8316	0.9280	0.9355
F-value	157.86	54.44	39.67	72.71

Source: Computations from field survey data, 2021.
$^{+}$ = Lead equation.
***, **,*: indicate variables are statistically significant at 1.0%, 5% and 10.0% risk levels respectively.
Figures in parentheses are t-ratios

Estimates of own Price, cross price and income elasticities for fish

The values of the own price, cross price and income elasticities of demand for fish was shown in Table 3. The result showed that the own price elasticity of fish was 0.71. This shows that a percentage change in the price of fish would result in less than proportionate change in the quantity demanded of it, hence being relatively inelastic. This result compared favourably with Effiong (2021) that obtained 0.83 as own price elasticity in pork demand in Cross River State of Nigeria. This reinforces the readily availability of fish with very minimal variation in the price level.

The income elasticity of demand for fish was shown in Table 3. The Table showed that the income elasticity of demand for fish was 0.5. This implies that a change in the consumer's income will result to a smaller change in demand for fish. This result is consistent with Ikechi and Ezihuo (2021) result in the consumption of pork. Engel's law in terms of elasticity agrees that food is income elastic. However, a change in consumer's money income will have a significant influence on consumption of the product either increasing or decreasing consumption.

The value of cross price elasticities of demand for fish with beef was 2.08. This implies that a one percent increase in the price of beef, will increase the consumption of fish by 2.08% in the study area. This indicates a strong degree of competitiveness and substitutability of beef with fish. This result is not consistent with the findings of Mohammed and Elechi (2017) whose findings shows that consumers of fish can only consume fish with beef (complementary relationship). Hassan and

Safyurtlu (1986) argued that cross-price elasticities are difficult to estimate and are very sensitive in sign and magnitude to the specification of demand equations, data, estimation procedures and the level of aggregation in time and across commodities. Many families usually combine both fish and beef in their meals due to the differences in their tastes.

Table 3: Estimate of Own Price, Cross Price and Income Elasticities of Demand for fish in Umuahia Metropolis of Abia State Nigeria

Category of Demand Elasticity	Commodity	Elasticity Coefficients
Own Price	Fish	0.71
Cross Price	Fish and beef	2.08
Income	Fish	0.5

Source: *Computation from field survey data, 2021*

Conclusion

The consumers of fish in Umuahia metropolis were majorly civil servants with high literacy levels. Subsequently, the socio-economic characteristics of fish consumers had positive influence on their consumption levels. From this study it was concluded that price of substitutes had negative influence on the quantity of fish demanded while level of income and level of education had positive influence on the quantity of fish demanded. The result of the analysis also showed that price and income were relatively elastic. It is also relatively elastic to festivals. Finally, inadequate income was outstanding problem in fish consumption.

Recommendations

The demand for fish in Umuahia metropolis, Abia state can be enhanced through the following recommendations which stem from the findings of this study;

i. The consumers identified were more of civil servants with low income and different levels of formal education as knowledge of the nutritional value of fish enhances their consumption decisions.

ii. Expansion in fish production should be promoted since most consumers fall within the income category that preferred the commodity (fish) as this will help ensure fish protein supply. This will create job opportunity for teaming youth who may be interested in the enterprise.

iii. All the significant variables enhancing demand for the commodities should be taken into consideration in policy formulation and implementation as far as production and consumption are concerned.

iv. Government should subsidize the inputs that are required in fish production in Umuahia metropolis.

References

Adeniyi, O.R, Omitoyin, S.A & Ojo, O.O (2018). Socio-Economic Determinants Of Consumption Pattern Of Fish Among Households In Ibadan North Local Government Area Of Oyo State, Nigeria. *African journal of food, agriculture, nutrition and development.* 5(2): 6537-6552.

Ahmed, G & R. Krishea (2020) Inter-Household and Consumption of Fish and Meat Consumption in Fishing Communities in Imo State of Nigeria. British Journal of Nutrition, 97; 145- 152.

Alexandratos N. (2019). World Agriculture towards 2018:An FAO study .Rome and Chichester ,U.K. Food and Agricultural Organization of the United Nations and John Wiley. Pp 34-41.

Amao J.O, Oluwatayo I.B. & Osuntope F.K.(2016) Economics of Fish Demands in Lagos State, *Nigeria. J. Hum. Ecol.*, 19(1): 25-30.

Andrew, W. S. (2020) Global Production and Consumption of Animal Source Food. Annual Production and Health Division. Food and Agriculture Organization. United Nations. Rome Italy.

Anyadike, R.N.C. (2002): "Climate and Vegetation" in Ofomata, G.E.K. (ed). A survey of Igbo Nation. Africana Publishers Ltd, Onitsha, pp 73-82.

Bessler, D. A. (2002) Inter- Household and Intron-Household Patterns of fish and meat consumption in fish communities in Nigeria and Britain. *British Journal of Nutrition* 97:145-152.

Central Bank of Nigeria (CBN) (2002). Domestic Consumption of Annual Protein. Annual Reports of the Central Bank of Nigeria 23pp.

Chimboza, D. and E. Mutandwa (2007) Measuring the Determinants of Brand Preference in diary Product Market. African Journal of Business Management. 1 (9): 230 - 237.

Dalhatu M. and Ala A.L. Analysis of Fish Demand in Sokoto Metropolis, Sokoto, Nigeria. *Nigerian Journal of Basic Applied Science* (2018), 18 (2): Pp 154-159.

Edet E O, Udoe P O and Uwah E D (2018) Costs and Return analysis of fish farming in Calabar metropolis, Cross River State Nigeria. Global Journal of Agricultural Sciences VOL. 17, 2018: 23-31 DOI: https://dx.doi.org/10.4314/gjass.v17i1.3

Effiong E. O. (2004) Pork consumer behaviour in Cross Rivers State, Nigeria: An Emperical Evidence. *Journal of Agriculture and Food Science.* 2(1): 43-47.

Ezeh, C. I. (2020) Poverty Profiles and Determinants of Expenditure of Rural Women Household in Nigeria. *The Nigerian Journal of Development Studies* 6(1): 187-204.

Fabiyi, Y.L. (1985) Demand for fish in Calabar, Cross-Rivers State, Nigeria. Proceedings of the 4th Annual Conference of the Fisheries Society of Nigeria, Port Harcourt, November 26th-29th, pp 62-70.

Food and Agricultural Organization (FAO) (2017). The State of Food Security and Nutrition in the World: Building Resilience for Peace and Food Security. Rome: Food and Agriculture Organization of the United Nations

Food and Agricultural Organization (FAO) (2019). Global Perspective Agriculture: Towards 2015/30. *Technical Interview Report: Economics and Social Department. Food and Agricultural Organization of the United Nations.* Rome, Italy.

Food and Agriculture Organization ,FAO, (2019) *Fish for food and development. FAO Annual* Publication ,Rome.58Pp

Food and Agriculture Organization FAO (2015) *Small Scale Aquaculture in Sub-Saharan Africa.* Revisiting the Aquaculture Target Growing Paradigm Rome. FAO Fisheries.

Food and Agriculture Organization FAO (2016) Fisheries Management in the Federal Republic of Nigeria.

Food and Agriculture Organization FAO (2019). Year Book Fisheries Statistics FAO Publication.

Gbigbi T M (2021) Determinants of Frozen Fish Consumption by Households in Delta State, Nigeria. International Journal of Agricultural Science, Research and Technology in Extension and Education Systems (IJASRT in EESs). 2021: 11(1):33-40

Hassan, Z.A. and A.N. Safyurtlu (1986). "Market Demand Functions." In: Capps, O. Jr., and B. Senauer (eds). *Food Demand Analysis, implications for future consumption*, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, U.S.A p1.

Igwe, K. C. and Onyekwere O N (2020) Meat Demand Analysis in Umuahia Metropolis, Abia State Nigeria. *Agricultural Journal* 2(4): 550-554.

Ikechi K A and Ezihuo N (2021) Demand analysis for beef and pork consumption among households in Port Harcourt city of Rivers State, Nigeria. *Agricultural Economics and Extension Research Studies (AGEERS)* 9(1): 9-16.

Jim, M. and Tunde, A. (2021). "Opportunities in Aquaculture and Fisheries in Nigeria". Fish Farming Big Industry in the Future. National Agriculture Focus. (1) 4, ;10. *An Agricultural News Magazine* Published by

Foundation Consultants Limited, Abuja. October Edition.

Kotler, P. and Armstrong, G (2004) *Principles of Marketing*, 10th edn, Indian: Pearson Educational Inc

Kotler, P. and Keller, K. L. (2009) *Marketing Management*, 13th edn, New Delhi: Prentice-Hall of India

Mohammed I A and Eleche U H (2017) Econometric Analysis of Demand for Beef, Fish and Eggs in Dekina LocalGovernment Area of Kogi State, Nigeria. *American Journal of Food Science and Nutrition Research.* 4, (4:130-136.

National Population Commission (NPC) (2016) National Population Commission of Nigeria. Census Report.

Nwachukwu, I. N, N. M. Agwu and C. I. Ezeh (2008). Comparative study of Consumer Purchase attitude of Local and Foreign Rice in Abia state Nigeria. *Proceedings of the 42nd annual conference of ASN held at Ebonyi state University on 19th - 23rd Oct* pp. 764-767.

Okorji EC (1999). Dimensions of Rural Poverty and Food self-sufficiency Gap in Nigeria". In: *poverty Alleviation and Food Security in Nigeria.* Fabiyi, Y. L. and E. O. Idowu (eds.). Nigerian Association of Agricultural Economists (NAAE), 1999:52 - 58.

Oladimeji, Y. U. (2017). Trend in Fish production parameters in Nigeria and its total estimated demand: Empirical evidence from Fish production, *Journal of Animal Productive Resources*, 29 (1): 410-418.

Olayide S.O. and Olayemi, K.K. (2020), Economic Aspects of Agriculture and Nutrition No 2 Development Policy Centre Ibadan Nigeria.

Onyekuru, N.A., Okorie, O.J., Ugwu, E.,and Nwokorie, U. M. (2020). Determinant of Catfish (Clarias spp) production in Nsukka Local Government Area of Enugu state, Nigeria. *AKSU Journal of Agricultural Economics, Extension and Rural Development. Vol.3(1): 43-49*

Onyeneke R.Y and Nwakwu J. (2018). Micro level Analysis of Beef and Fish Consumption in Imo State Nigeria. *Agricultural Research and Reviews* 1 (1): 1-8.

Phil-Eze P.O. (2001): "Vegetation of the Nsukka plateau: Empirical analysis of forms and patterns".in Nwafor et al (eds), Geographical reports of the university of Nigeria: Essays in honour of Professor G.E.K. Ofomata. Published by geography department. UNN

Schrimper, R.A. (1986). "Effect of Increasing Elderly Population on Future Food Demand and Consumption." In: Capps, O. Jr., and B. Senauer (eds). Food demand analysis, implications for future consumptions. Virginia Polytechnic Institute and State University, Blacksburg, Virginia, U.S.A, Pp. 163 - 176.

Umberger, W.J., D.M Feuz, Calkin and B.M. Sitz (2003). Country of Origin Labeling of Beef Products: US Consumers Perception. *Journal of Food Distribution Research* 34(3): 103 - 116.

World Health Organization (2021). The Global Data base on child Nutrition Geneva, world health organization.

Zanna B and Musa M. The Challenges of Sustainable Fish Farming Culture in North-East of Nigeria. *Int J Oceanogr Aquac* 2023, 7(4): 000278.