EMPIRICAL ANALYSIS OF FISH CONSUMPTION AMONG HOUSEHOLDS IN LAGOS STATE, NIGERIA

Okelola O.E.[1] and Babalola D.A.[2]

[1]Dept of Agriculture & Industrial Technology, Babcock University, Ilisan, Remo, Ogun State.
Corresponding Email: oecapitalcity@gmail.com. Tel: 08028849180.

[2]Dept of Agriculture & Industrial Technology, Babcock University, Ilisan, Remo, Ogun State.
Email: babalolada@babcock'edu.ng

ABSTRACT: *This work studies fish consumption among households in Lagos State. A multistage sampling technique was used to select 400 households from Lagos Island, Eti Osa, Surulere, Shomolu, Kosofe and Oshodi/Isolo Local Government Areas. A structured questionnaire was used to collect the data needed for the study. The data were analyzed using descriptive statistics and inferential statistics (multinomial logit model). The result indicated that the study area had more male-headed households (52.5%). The average monthly expenditure on fish by household was ₦3,640. The result of the descriptive statistics further shows that a large number of consumers had a preference for fresh fish (60.7%) and smoked fish (54.7%). The result of the multinomial result shows that Education, Age, mode of income, Gender and Household income were among the significant factors influencing households' preference for the form of fish consumed. The study recommends the improvement of the market for fish by creating value through packaging processing and storage and better storage facilities are pertinent. This can be achieved by government provision of steady power supply and agro-processing industries which must be linked to production for household consumption.*

KEYWORDS: Fish, Consumption, Household, multinomial Logit, Lagos-State.

INTRODUCTION

Fish is an important component of a modern healthy diet and also a critical food source for developing countries Fish provides key macro and micronutrients, and protein and are low in saturated fat (Lynch & Macmillan, 2017). Fish consumption has been linked to a wide array of health benefits for infants and adults including the developing foetus (Millen et al, 2015). According to Nesheim and Taktine (2007), fish can supply up to 50 per cent or more of high-quality protein, and mineral elements(B6, B12, niacin, thiamine, riboflavin, Vitamin E) and essential fatty acids such as oleic acid and omega3 fatty acid.

The united nation food and Agriculture organization noted that world population growth has outweighed fish production due to increased fish consumption. Fish consumption per capita across the world has increased from 9.0kg in 1961 to above 20.5kg in recent times as a result of the upsurge in population growth, urbanization and demographic dynamics(FAO, 2018, Falaye & Jenyo-Oni, 2009). Fish consumption (demand) raises enormous challenges for economies. The utilization of fish varies for food and non-food purposes across countries and regions. More importantly, the utilization of fish for direct human consumption increased significantly over the years from 67 per cent to 88 per cent in 2016 (Vannuccini et al., 2018). Hence, the consumption pattern for fish has peculiar implications for the sub-sector in various economies.

Fish plays a vital role in feeding the world's population and contributing significantly to the dietary protein intake of hundreds of millions of the populace. In Nigeria, 50 per cent of the total average intake of animal protein is attributable to fish (Liverpool-Tasie et al., 2021).

Fish has always stayed as a rich source of food in terms of taste, nutrients and also medicinally at times. Fish consumption is helpful in the growth and development of children till they reach the adult stage. The invaluable source of food has been serving the people from times immemorial. The alarming sources of health and nutrition crisis can find answers in fish consumption, out of a large number of health benefits of eating fish, its contribution as a fabulous source of high-quality proteins is remarkable and is to be noted. This cannot be given or substituted by even a single vegetarian food.

The quality of the fish/seafood freshness is the prime determinant. In this regard, frozen fish are treated as non-fresh, bad quality, tasteless, watery and boring (Olsen, 2001). Other attributes like price and convenience also have an impact on fish consumption attitude formation. However, Olsen (2004) found price, value for money and household income not barriers to seafood consumption, while Verbeke (2005) reported that price negatively affects fish consumption attitude because of complex preparation and cooking procedure, fish is treated as an inconvenient food item (Verbeke *et al*, 2006).

Fish is a highly perishable food which needs proper handling and preservation if it is to have a long shelf life and retain a desirable quality and nutritional value (FAO, 2010). The central concern of fish processing is to prevent fish from deteriorating. The most obvious method of preserving the quality of fish is to "keep them alive" until they are ready for cooking and eating. A release report by FAO (2006) listed other methods to preserve fish and fish products including the control of temperature using ice, refrigeration or freezing; the control of water activity by drying salting, smoking and freeze-drying; the physical control of microbial loads through microwave heating or ionizing irradiation; the chemical control of microbial loads by

adding acids; and oxygen deprivation, such as vacuum packing. The principle behind any preservation technique is explicit and it is aimed at preventing fish spoilage, lengthening shelf life by inhibiting the activity of spoilage bacteria and metabolic changes. Fish normally host many bacteria and most of the bacteria on spoiled fish played no role in the spoilage (Hush, 1988).

Despite the importance of fish in Africa, particularly for addressing malnutrition, the examination of fish demand has been limited. There are few survey-based analyses of the demand in Africa, though exceptions include Abdulai and Aubert (2004) for Tanzania; Tambi (2001) for Cameroon; and local area studies such as Amaoet al. (2006) for Lagos State in 'Nigeria. Zhou and Staatz (2016) used Living Standards Measurement Study (LSMS) data from around 2012 to estimate income elasticities for fish as a general category compared with other food categories tor West Africa. Desiere et al (2018) also used LSMS and FAO data to assess current and future meat and fish consumption, in a group of countries in sub-Saharan Africa. Gen-schick et al. (2018) analysed urban Zambian fish consumption patterns of the poor strata. Moreover, there has been little research globally on the determinants of the form in which fish is purchased. 'Traditional forms' include dried/salted, smoked, and fresh, all of which were common prior to the advent of refrigeration, and freezing. The main non-traditional product form is frozen fish, which is thawed after purchase for use at home or in restaurants.

Fish consumption analyses have often treated fish (and 'sea food') as a homogeneous group of products and few studies differentiate either species or form. There are some exceptions: Toufique et al (2018) distinguish fish originating from capture or aquaculture. Dey et al. (2008) distinguished dried fish from other fish in Asia. In Europe and the US, Trondsen et al (2004) distinguish processed from fresh, and Verbeke et al. (2007) distinguish traditional presentation styles versus fresh. In the United States, Muhammad and Hanson (2009) distinguish fresh and frozen catfish. In Africa, studies of demand for different fish forms are either of a locality, of one species, or limited product forms (Kumar et al, 2005: Jimoh et al, 2013; Dauda et al., 2016).

The African literature has not had a systematic analysis of (i) consumption of domestically produced versus imported fish; (ii) consumption of different forms of fish, such as frozen, fresh, dried and smoked; (iii) consumption of fish over spatial categories such as agro-ecological zones and regions with different levels of development. These gaps are important for the following reasons. First, unlike in Asia, food imports are among the top policy concerns in Africa (African Development Bank, 2016) due to their viewed foreign exchange burden and their competition with the domestic fish sector. In Africa, the share of imports in total apparent consumption of fish more than doubled over the four decades of the 1970s-2000s, to a high of 39% by 2017   . This compares to the import share (derived from FAOSTAT) in all food for 2017 of 13% (Liverpool-Tasie et al., 2020.

At the household level consumption pattern may depend on the availability of the income, price of the commodities, primary activities of the household, social structure and customs. The actual quantity of fish consumed, the price paid by the consumer for 1kg of fish and other factors like education level, age, gender, household size and income affect the consumption of fish is, however, poorly documented, particularly in Lagos state, besides the empirical evidence emerging from few studies on fish demand at the household level which has yielded a mixed result that is inconclusive and contradictory. Thus, the questions on how household consumption is still worthy of further research such as the one being undertaken in this study. Also, empirical evidence is largely scanty, isolated and devoid of in-depth analysis of the

combined effects of socio-economic and microeconomic factors on fish consumption in the context of their significance and size in Lagos state, Nigeria. This creates a gap in the literature.

Fish consumption in Lagos State has been an important issue not because it is related to poverty and food security alone but because it is highly correlated to living standards. Protein malnutrition is due to a shortage in the supply of animal protein, although there are other sources of protein like plant protein sources. The Food and Agriculture Organization (FAO, 2007) estimated minimum protein requirements at70gm/capita/day and the recommended protein intake from animal sources to be 35gm/capita/day. In the quest for solutions to the problems of food security and undernutrition in Lagos state, there is an urgent need for fish consumption surveys in the state, in order to reduce the incidence of protein-energy malnutrition, particularly among vulnerable groups, and so increase the standard of living of the average *Lagos indigene*. The Objectives of this study include: examining the socio-economic characteristics of the household, determining consumers' preference for fish, identifying the various types and forms of fish consumed by the respondents and identifying the constraints for fish consumption in the study area.

METHODOLOGY

Study Area

The study was carried out in Lagos State Nigeria. Lagos State is located in the southwestern part of the Nigerian Federation. On the North and East, it is bounded by Ogun State. In the West, it shares boundaries with the Republic of Benin. Behind its southern borders lies the Atlantic Ocean. 22% of its 3,577 km² are lagoons and creeks. It lies within the latitudes 6 and 24¹ and 6 31¹ N, longitude $3^0 16^1$ and $3^0 37^1$. Lagos State has 20 local Government Areas out of the 774 Local Government Areas in Nigeria. It Comprises three senatorial districts (Lagos east, Lagos west and Lagos central).It has a population of 9,013,534 as of the 2006 National population census (NPC).The highest maximum temperature ever recorded in Lagos was 37.3°C (99.1°F) and the minimum was 13.9°C (57.0°F) (Lagos Meteorological Organization 2012). Multi-stage sampling technique was used in selecting the respondents for the study. The first stage in the sampling procedure was the stratification of the study area into cells of high, medium and low-density areas (Oluwole Samuel Ojewale, 2014). With respect to Lagos, areas of high population density are usually populated by the low-income classes. This sampling technique was to ensure that each income group was adequately represented in the sample. In the second stage, Lagos Island and Etiosa local government areas were selected for the low-density areas, while Surulere and Shomolu LGA represented the medium-density areas. For the high-density areas, Kosofe, and Oshodi/Isolo LGA were selected (these LGA were selected using convenience sampling). The third stage involved the selection of households via a random sampling procedure. A complete list of all the households in each of the LGA was obtained from the National Population Commission Census list. A total of 400 households in these areas were randomly selected with sample sizes distributed proportionately to size.

RESULT AND DISCUSSION

Socio-Economic Characteristics of fish consumer household

The socio-economic characteristics analyzed include gender, age, marital status, family size, household income, occupation and forms of fish consumed.

Table 1 Distribution of Households by their socio-economics

Variable	Category	Frequency N= 400	Percentage
Gender	Male	210	52.5
	Female	190	47.5
Marital Status	Single	155	38.75
	Married	215	53.75
	Widowed	30	7.5
Age	Less than 20 years	68	17.0
	21 – 30 years	80	20.0
	31 – 40 years	88	22.0
	41 – 50years	103	25.75
	50years and Above	61	15.25
Educational Level	Informal education	68	17.0
	Primary school	88	22.0
	Adult literacy	61	15.25
	Secondary school	103	25.75
	Tertiary school	80	20.0
Family Type	Nuclear Family	198	49.5
	Extended Family	202	50.5
Family size	< 2	145	36.25
	2----5	213	53.25
	>5	42	10.5
Household Monthly Income	< ₦10,000	39	9.75
	₦10,00--₦19000	45	11.25
	₦20,000--₦29,000	66	16.5
	₦30,000-₦39,000	69	17.25

	₦40,000-₦49,000	78	19.5
	₦50,000 and above.	103	25.75
Monthly Expenditure on Fish (mean)	₦3,640		
Source of income	Salary	182	45.5
	Non-Salary	218	54.5
Occupation	Farming	50	12.5
	Civil Servant	102	30.7
	Trading	130	32.5
	Banking	70	17.5
	Artisan	53	13.25

Source: Field Survey, 2021.

The gender of the household heads is an important factor that has a significant influence on the preference and consumption pattern of fish by households. The distribution of household by gender and forms of fish is presented in Table 1 and shows that although the percentage of male-headed households (52.5%) are more than female-headed households (47.5%), the number of female-headed households is very substantial. This is in line with the result of Chianu & Tsujii(2007) where 99.7% of the surveyed household were male-headed. The distribution of the household by marital status is presented in Table 1. The result shows that 53.75% of the households were married while 38.75% are single and 7.5% are widowed. This shows that there is a tendency for more purchase of fish and increased consumption by households headed by married people than singles due to expansion in family size and greater responsibilities in terms of expenditures on food items. Therefore, there is a tendency for more purchases of fish (Amao & Ayantoye 2014). There is a tendency for the age of the household head to affect the consumption pattern of a household and may determine to an extent the type, quality and nutrition of a given household. This is in agreement with Aminu, Adebanjo and Mohammed (2016). Further results show that a large number of household heads (103) fell within the age group of 41-50 years and represented about 25.75% of the respondents. Age could be an important determinant in the quality and quantity of protein requirements of an individual and households (Amao et al., 2006). Education changes taste over time and usually affects consumption patterns, preference for food items and nutrition of a household. This is because consumers become aware of the nutritional value of protein-rich food items like beef, eggs and fish and subsequently enhance their consumption. The distribution of household heads by the level of educational attainment, as presented in Table 1, shows that household heads with secondary education had the highest percentage of 25.75%. The majority of the respondents (50.5%) belong to an extended family in the study. Family size has a significant effect on the consumption pattern for fish as with other food items. As the family size increases, there is a tendency for the household to consume more food generally, fish inclusive. The majority of the households in the study area (53.25%) had between 2-5 members. The literacy level of the respondents might have contributed to the relatively small household size. Education has been reported as one of the key determinants of the awareness and use of family planning measures (Babalola, Babalola & Oladimeji, 2012). Information on demographic patterns in Nigeria also shows that urban households are usually smaller than rural households

(Statista Research Department, 2021). The frequency distribution of income determines the type of income distribution most prominent in the study area. Table 1 shows that the majority of the respondents fall within the low-income group while those in the high-income class are relatively few. Low income may affect overall fish consumption and further determine the form of fish consumed by households. Table 1 shows that majority of households sampled (218) were non-salary earners, accounting for about 54.5% of total sampled respondents while (182) were salary earners, accounting for about 45.5% of total sampled respondents. A priori expectation is that the probability for salary earners to have a more planned and consistent consumption pattern than the non-salary earners is higher. This may also influence an increase in household purchasing power. However, most of the households in the study area are non-salary earners. In particular, the majority of the respondents are traders (33%). Most of the respondents spend the average monthly expenditure on fish by the household in the study area was ₦3,640.

Table 2 Distribution Of Household By Fish   Consumption Pattern

Variable	Frequency N= 400	Percentage
Fish consuming Household		
Yes	842	85.5
No	58	14.5
Reason for Fish Consumption		
Taste	111	74.0
Nutritious	132	88.0
Availability	77	51.3
Affordable	70	46.7
Low in cholesterol	88	58.7
Forms of Fish Consumption		
Fresh	91	60.7
Frozen	76	50.7
Smoked	82	547
Dried	79	52.7
Types of Fish Consumed		
Clarias (Catfish)	76	50.7
Tilapia	68	45.3
Mackerel (Titus)	78	52.0
Horse mackerel (Kote)	90	60.0
Croaker	84	56.0
Hake (Panla)	106	70.7
Herrings (Shawa)	23	15.3
Argentina Silos (Ojuyobo)	50	33.3
Choice of Purchased		
Market	113	75.3
Farm	50	33.3
Road Side	98	65.3

Import	29	19.3
Fish Storage		
Yes	315	78.75
No	65	31.25
Protein Source Consumed		
Chicken	98	65.3
Egg	115	76.1
Mutton (Sheep Meat)	18	12.0
Pork (Pig Meat)	36	24.0
Turkey	73	48.7
Chevon (Goat Meat)	56	37.3
Beef	77	51.3
Reason for Consumption of Other Protein Source		
Availability	107	71.3
Relatively Cheap	8	5.3
Taste	120	80.0
Smell	84	56
Size	99	66
Appearance	51	34
Constraint		
Distance from the Market	101	67.3
Low Traded Volume of Fish	18	12.0
Rapid Fish Spoilage	104	69.3
High price of fish	96	64.0
Low Level of Consumer Income	62	41.3
Religious Belief	38	25.3
Health Reasons	41	27.3

Multiple Response

Source: Computed from Field Survey (2021)

The result in Table 2 reveals that majority of households sampled (342), accounting for about 85.5% of total sampled respondents, consume fish as their major protein source. This suggests that there are more fish-consuming households in the study area. Also, the majority of households sampled (88.0%) gave nutrition as the major reason for consuming fish. Other reasons given include taste (74.0%), low cholesterol (58.7%), availability (51.3%) and affordable (46.7%). Increasing fish availability will likely increase fish consumption among the study population. More than half of the respondents (60.7%) prefer fresh fish to frozen, smoked or dried fish. About 50.7% of households indicated their preference for frozen fish, while 54.7% and 52.7% of the households sampled had a preference for smoked and dried fish respectively. The most preferred forms of fish by households are further presented in Table 2. A large proportion of households (106) accounting for about 70.7% of sampled households consumed Hake (Panla) compared with any other type of fish, 52% had a preference for Mackerel (Titus) while about 60% consumed Horse Mackerel (Kote). Some 50.7% of households preferred Clarias (catfish), 56% of households had a preference for Croaker, and

45.3% preferred Tilapia. The result in Table 2 reveals that the majority of the household sampled (70.7%) purchase their fish from the open wet markets. Furthermore, the majority of households sampled (315) fish consuming households accounting for about 78.75% of total sampled respondents store their fish. This corroborates their high preference for fresh fish. From Table 2, the majority of the respondents (76.7%) indicated that they consume eggs as an alternative protein source to fish. This shows that egg is a close substitute for fish in the study area. The relatively low price of eggs may also be responsible for this reference. The result in Table 2 shows that a higher proportion (80%) of the sampled household chooses availability as the reason for consumption of other protein sources. The result in Table 2 reveals that the majority of households sampled (104) fish-consuming households accounting for about 67.3% of total sampled respondents gave rapid fish spoilage as a constraint because they consume fresh fish and preserve it by refrigerating or sun drying. Rapid spoilage of fish could be a result of poor power supply to power the refrigerator used for the preservation of the fish. Some 101 sampled fish-consuming households accounting for 67.3% gave distance from the market as their challenge, other constraints include the high price of fish (64%). High prices of the product could be a result of high transportation, high cost of production and high cost of preservation. Low level of consumer income (41.3%), health reasons (27.3), religious belief (25.3%) and low traded volume (12%).

Table 3: Multinomial Logit Regression Output for factors influencing forms of fish consumed by households

Variables	Frozen			Smoked			Dried	
	Beta Coeff.	Std. Error	Exp (B)	Beta Coeff.	Std. Error	Exp (B)	Beta Coeff.	Std. Error
Intercept	-4.107	1.378		-28.592	2.350		1.419	1.120
Education (yrs)	.175*	.060	1.192	.043	.086	1.044	.009	.068
Age (yrs)	.032	.022	1.033	.081	.043	1.084	-.076*	.027
Household Size	-.101	.093	.904	-.033	.129	.968	-.043	.103
Mode of income (salaried =0; Non salaried = 1)	-1.06*	.510	.345	-.381	.828	.683	-1.65*	.537
Gender (male = 0: female =1)	-.118	.497	.889	2.343*	.857	10.415	1,048	.551
Marital status (Married =1; Single =0)	1.918*	.585	6.806	21.399	.000	1965615973.525	-.147	.555
Household Income {₦}	.310	.179	1.364	.773*	.274	2.166	.329	.181

Pseudo-R^2 = 0.56; -2 Log-Likelihood = 274.218; Chi-square = 110.603*; Reference category = Fresh Fish form; *P<0.05

Source: Field Survey, 2021.

The Multinomial Logit Regression Model was used to capture the factors that influence the households' consumption preference for different forms of fish as earlier described in the study. This model is appropriate since the dependent variable is nominal. The diagnostic result for the Logit model shows that the chi-square, which measures the goodness of fit of the model, is statistically significant (x^2 =110.603; P<0.05). Thus, the null hypothesis which says that the intercepts and coefficients are zero is rejected because the model is of good fit. The Pseudo-R^2 value (0.56) also indicated that the model is good. The result in Table 3 provides information on the comparison between consumption of various fish forms and the reference category which is 'consumption preference for fresh fish'. For the comparison between the consumer preference for frozen fish and fresh fish, the coefficient of education is significant with a positive sign (at p<0.05). An increase in respondents' education increases the odds or probability of respondents' consumption of frozen fish by 1.19 (exp(0.18)). While the comparison between smoked and fresh fish is also significant with a positive sign (at p<0.05). An increase in respondents' education status will lead to more awareness about the nutritional benefit of fish consumption. The descriptive result shows that the literacy level among the respondents is relatively high which will facilitate the consumption of frozen fish. In the comparison between consumption preference for Dried fish and fresh fish in Table 4.3, the coefficient of age is significant and with a negative sign (at p<0.05). This implies that older household heads tend to consume more fresh fish than the younger ones leading to -.076* (exp(0.18)). The descriptive result shows that most of the respondents are above 40 years thus increasing the preference for fresh fish as compared to dried fish. In the comparison between consumption preference for frozen fish and fresh fish in Table 3, the coefficient of the mode of income is significant with a negative sign (at p<0.05). This implies that a positive change in income status will reduce the fish consumption preference for frozen fish among the respondents by 0.345 (exp(0.18)). Thus with increasing income, respondents tend to prefer fresh fish to frozen fish. Also in the comparison between consumption preference for dried fish and fresh fish in Table 3, the coefficient of the mode of income is significant with a negative sign (at p<0.05).This implies that a percentage in income status will the consumption of the dried fish as compared to fresh fish by 0.683 (exp(0.18) among the respondents. This implies that preference for dried and frozen fish forms is low among high-income earners as compared to fresh fish. In the comparison between consumption preference for smoked fish and fresh fish in Table 4.3, the coefficient of gender is significant with a positive sign (at p<0.05).This implies that female-headed households have a higher probability to prefer the consumption of smoked fish over fresh fish by 2.343 (exp(0.18)). This implies that smoked fish is more preferred than fresh fish by women. This may be because women are more involved in the smoking process of fish preservation. However, the descriptive result shows that male-headed households are more than female-headed households in the study area. In the comparison between consumption preference for frozen fish and fresh fish in Table 3, the coefficient of marital status is significant with a positive sign (at p<0.05). This implies that an increase in married respondents increases the odds or probability of respondents' consumption of frozen fish by 0.6.806 (exp(0.18)) as compared to fresh fish. The descriptive result shows that many of the household heads in the study area are married. In the comparison between consumption preference for smoked fish and fresh fish in Table 3, the coefficient of household income is significant with a positive sign (at p<0.05). This implies that an increase in income increases the probability of consumption of smoked fish over fresh fish by 2.16 (exp(0.77)). However, the descriptive result shows that most households have low incomes. The study found a positive relationship between education and demand for frozen fish. This outcome is in line with various literature (Can et al, 2015 & Buger et al, 1999) who found a significant association

between education and consumption of fish. There are, however, other studies which similarly found no association between education and fish consumption (Hicks & Mcdermot 2008). The income of consumers and its related variable of the total budget for fish showed a strong positive relationship to demand fish, contrary to the sign on the income variable for fish consumption by Burger et.al 1999 in their USA study. Other known studies which corroborated the positive relationship between the income and household size variable against the demand for fish include Amao et al., 2006; Can et al., 2015; Dalhatu & Ala 2010. Based on the multinomial result, the earlier stated null hypothesis which says that socio-economic factors do not significantly influence forms of fish consumed by respondents in the study area is rejected in favour of the alternative hypothesis.

CONCLUSION AND RECOMMENDATION

This study examines fish consumption patterns among consuming households in the Lagos metropolis with a view to analyzing the trends of fish consumption, consumers' preference for fish and the functional relationship between the quantity of fish consumed and selected variables. The variables examined include income of the household, taste, price of fish, occupation, household size, level of education and age of the household head which were found to influence households' fish consumption expenditure. The food and fish consumption expenditure analysis of households revealed that the average monthly expenditure on food and fish tends to increase with an increase in household income, but the percentage of income spent on food and fish decreases with an increase in the income of the household in accordance with Engels law. For the average monthly expenditure on fish by household size, it was observed that the average monthly expenditure on fish increases as the household size increases. This was found to be true for the average monthly expenditure on fish by the age of the household head. As the age of the household head increases, their average monthly expenditure on fish also increases. Fresh fish is the highest form of fish in the consumer market, whereas smoked fish is the lowest priced. As the income of the consumers increases, they buy only a little more smoked and frozen fish because most smoked fish consumed in the metropolis are perceived to be of low quality. Wealthier consumers tend to buy more fresh fish and dried fish (such as stockfish) which consumers perceived to be of better quality in terms of nutrition and safety. The dried and fresh forms of fish are substitutes mainly because the most common type of fresh fish in the area (the catfish) is also the dried fish in the market. The socio-economic characteristics reveal that the consumers are not poor. These categories of the population are mostly educated and well exposed and are well within their regular intake of fish protein. However, there is a need for further research to disaggregate consumption groups and account for the fish protein intake level in the study area. There is a need, therefore, to increase domestic fish supply in the country and ensure fish supplies to consumers at affordable prices in all markets in the metropolis. Facilitation of supply of fresh and frozen fish is recommended because it attracts higher preference, especially in the open market. Finally, there is a need to create consumer awareness of nutrition information through education and media promotion.

REFERENCE

Abdulai, A. &Aubert, D. 'A cross-section analysis of household demand for food and nutrients in Tanzania', Agricultural Economics, Vol. 31(1), (2004) p#.67–79.

Amao J.O and Ayantoye K (2014). Consumer Preference and consumer Pattern for selected Forms of Fish in Oyo State, Nigeria. *International Journal of Science, Environment and Technology, 3 (3): 841-860.*

Amao,J.O., Oluwatayo,I.B.&Osuntope,F.K.(2006).EconomicsofFishDemands in Lagos state, Nigeria.*Journal of Human Ecology*. 19(1): 25-30.

Aminu, F.O.; Adebanjo, O.A.& Mohammed, H.A.(2016).Determinants of Food Expenditure Patterns Among Households in Oshodi Isolo Local Government Area of Lagos State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment,* **12**(2):98-102.

Babalola D A., Babalola, Y T., & Oladimeji A A. (2012). Assessing the Use of Family Planning Information among Farming Households in Nigeria: Evidence from Ogun State. *Asian Journal of Rural Development 2(2), 40-46.*

Can MF, Gunlu A & HY CanFish consumption preferences and factors influencing it. Food Science and Technology. (2015);35(2): 339 –346.

Chianu J.N &Tsujii H. (2007). Gender differences in Labour allocation in West Africa: A case study of the Savannas of Northern Nigeria. Human and Social Sciences Journal2 (2): 93-   103.

Dalhatu M & AL AlaAnalysis of fish demand in Sokoto Metropolis, Sokoto, Nigeria. *Nigerian Journal of Basic and Applied Science. (2010); 18(2):154-159.*

Dauda, A. B., Ojoko, E. A. &Fawole, B. E. 'Economic analysis of frozen fish demand in Katsina Metropolis, Katsina State, Nigeria', *Journal of Fisheries and Aquatic Science, Vol. 11(1), (2016) pp. 93–99.*

Desiere, S., Hung, Y., Verbeke, W. &D'Haese, M. 'Assessing current and future meat and fish consumption in Sub-Sahara Africa: Learnings from FAO Food Balance Sheets andLSMS household survey data', Global Food Security, Vol. 16, (2018) pp. 116–126.

Falaye AE and A Jenyo-Oni Aquatic biodiversity and the implication in artisanal Fishing production. *African Journal of Livestock Extension.* (2009); **7**:39-43

FAO (1990): Nutrition in Agriculture: Conducting Small-Scale Nutrition Surveys. A Field Manual Nutrition, Planning Assessment and Evaluation Service. Food Policy and Nutrition Division.

FAO**.** The State of World Fisheries and Aquaculture: Meeting the Sustainable Development Goals. FAO, Rome. 2018.

Food and Agriculture Organization. (2007). FAO Fishery Department Country Profile. Nigeria   FID/CP/NIR; 2007.

Genschick, S., Marinda, P., Tembo, G., Kaminski, A. M. &Thilsted, S. H. 'Fish consumption in urban Lusaka: The need for aquaculture to improve targeting of the poor', Aquaculture, Vol. 492, (2018) pp. 280–289.

Jimoh, W. A., Popoola, M. A., Ibrahim, G. A., Ayeloja, A. A. &Ayanwale, A. O. and Akinosho, G. A. 'Evaluation of consumer's preferences for fresh and frozen fish products in Ibadan Metropolis Nigeria', Journal of Agricultural Economics, Vol. 9(1), (2013) pp. 13–20.

Liverpool-Tasie, L.S.O., A. Sanou, T. Reardon, and B. Belton. (2021). Demand for imported versus domestic fish in Nigeria. *Journal of Agricultural Economics, 72 (3), 782–804.*

Millen B, Lichtenstein AH, Abrams S, Adams-Campbell L, Anderson C, Brenna JT, Campbell W, Clinton S, Foster G, Hu F, Nelson M, Neuhouser M, Pérez-Escamilla R, Siega-Riz AM and M Story Scientific Report of the 2015 Dietary Guidelines Advisory Committee of Disease Prevention and Health Promotion Washington, DC. (2015).

National Population Commission (2006).Population Census of Nigeria, Government Press, Abuja, Nigeria.

Nesheim MC and AL Yaktine Seafood choices: Balancing benefits and risks. The National Academic Press, Washington, DC. (2007).

Tambi, N. E. (2001). Analysis of household attitudes toward the purchase of livestock products and fish in Cameroon, Agricultural Economics, 26(2), 135–147.

Toufique, K. A., Farook, S. N. & Belton, B. 'Managing fisheries for food security: Implications from demand analysis', Marine Resource Economics, Vol. 33(1), (2018) pp. 61–85.

Vannuccini S, Kavallari A, Bellu LG, Muller M and D Wisser: Understanding the impact of climate change for fisheries and aquaculture: global and regional supply and demand trends and prospects. **In** M. Barange, T. Bahri, M.C.M. Beveridge, K.L. Cochrane, S. Funge-Smith and F. Poulain (eds.) Impacts of climate change on fisheries and aquaculture: synthesis of current knowledge, adaptation and mitigation options. FAO Fisheries and Aquaculture Technical PaperNo. 627. Rome, FAO. Pp 41-57. (2018).

Verbeke, W. (2006); Functional foods: consumer willingness to compromise on taste for health? Food Quality and Preference, 17: 126–131.

Verbeke, W., andVackier, I. (2005). Individual determinants of fish consumption: application of the theory of planned behaviour. *Appetit*6http://dx.doi.org/10.1016/j.appet.2004.08.006. PMid: 15604034.

Yamane T (1967). Statistics, an Introductory Analysis, 2nd ed., New York: Harper and Row 289p.

Zhou, Y. and Staatz, J. 'Projected demand and supply for various foods in West Africa: Implications for investments and food policy', Food Policy, Vol. 61, (2016) pp. 198–212.