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Fish consumption preferences and behavioural pattern in Oyo state, Nigeria

Adesiyan, O. F.
Department of Agricultural Economics, Obafemi Awolowo University, Ile-Ife, Nigeria
Correspondence details: oadesiyan@oauife.edu.ng, 08035138766, 09069057993

Abstract: The study investigated fish preference and consumption pattern of households in Oyo State, Nigeria. It specifically analysed fish consumption preference of the households; estimated the determinants of the fish consumption preference and analysed the consumption pattern of fish in the study area. Multistage random sampling techniques were used to collect primary data from 151 respondents. The data were analysed using Tobit regression model and Quadratic Almost Ideal Demand System (QUAIDS). The results show that residents in Oyo state have preference for tilapia and mackerel fish be it fresh, frozen, smoked or dried. Further results also revealed that income, price of egg, price of beef and price per kg of frozen fish influence the consumption preference of fish in the study area. Also, the study established that fish is a necessity in the study area. It is therefore recommended that the benefits of fish should be advocated by the government and the non-governmental organisations among the respondents in the study area for improved behaviour towards fish consumption.
Keywords: Fish preference, Consumption pattern, QUAIDS

INTRODUCTION

In Nigeria, the prevalence of chronic or transitory food and nutrition insecurity in households has been a major problem. According to International Rescue Committee (2024), it is about 58%. Findings from Erdogan et al.; (2011) and Blisard et al., (2020) showed that pregnant women and men that lack ability to consume enough fish are prone to malnutrition, cardiac and other related diseases. 14.3 million people in Nigeria were regarded as undernourished in 2016 (Food and Agricultural Organisation Statistics 2017). However, malnutrition is a major problem that is rampant among the larger population of children (Quamme and Iversen, 2022). Also, low fish consumption in men and women increases their disease exposure. Aside what malnutrition does to adults, about 67% of children between the age of 0.5 – 2 years lack food rich in iron and 52% lack the intake of Vitamin A-rich foods in 24-hour diet (National Population Council (NPC) and International Classification Functioning Disability and Health (ICF), 2014). In addition, about 10.8% of children under the age of 5 years had a prevalence of wasting, while 43.8% are stunted (Nigeria Bureau of Statistics and United Nations International Children's Emergency Fund (UNICEF), 2017). Findings from Ayanoye (2023) revealed that the issue of nutrition insecurity is prevalent in the study area (52%) with little or no information about their consumption pattern now and efforts to improve their welfare.

In the same vein, NBS (2015) revealed that socio-economic factors, power outages, seasonal and climatic fluctuations affect the frequency of fish consumption, the type of fish households prefer for storage and consequently for consumption. This necessitates the need to probe into the frequency of fish consumption and their preference in the study area. During harvest around February, according to NBS (2015), about 38% of households prefer frozen fish neglecting other types of fish as a result of some reasons or factors which are yet to be unravelled or determined that explains household consumption preference and behavioural pattern in the study area. Consumer preferences of products usually depend on two major factors, which are the consumer's socioeconomic status and the nature of the product (Maria Font-i-Furnols & Luis Guerrero 2014, Isabel Schaufele & Ulrich Hamm 2017). The social and economic status of consumers plays a significant role in fish consumption patterns and consumption preferences. Consumer preference is influenced by income, religious composition, among many other factors affecting fish consumption across different regions and communities in Nigeria (Felix, et al, 2023 & Umaru et al, 2024). In 2019, Oyo state is one of the states in southwestern Nigeria with high profile of food insecurity and malnutrition. Therefore, studying their preference for fish as a valuable source of protein might improve food and nutrition security thereby improving their livelihood.

Fish, has high healthy value in terms of high concentration of Omega-3 fatty acid (FAO, 2017), supplies essential nutrients to the body in the form of protein, lipids, vitamins and minerals (Tsado et al., 2012) which makes it a reliable way to combat food insecurity. Fish is rich in ω-3 polyunsaturated fatty acid with an optimum concentration of docosahexaenoic acid and eicosapentaenoic acid (Kong et al., 2011). Also, malnutrition and non-communicable diseases such as hypertension, diabetes, and heart diseases can be prevented through the consumption of healthy diets (WHO, 2016).

According to Ayantoye Kayode (2023), Oyo state is one of the states in the Southwest Nigeria with high profile of food insecurity and ultimately malnutrition. Findings from the literature shows that the consumption of two servings of fish per week reduces the risk of coronary heart diseases (The American Heart Association, 2015). It also has a positive health impact on chronic health problems such as hypertension, inflammation, and type 2 diabetes which could have been averted with daily

consumption of fish in its right quantity. Since several fish varieties predominate the market in Oyo state, it becomes very important to unravel the type of fish they prefer and the factors promoting it for a nutritionally secured environment in the state.

The broad objective of this study is to investigate the fish consumption preferences and its behavioural patterns in Oyo state.

The specific objectives are to

(i). analyse fish consumption preference of households; and

(ii). estimate the determinants of fish consumption preference and pattern of households among households in Oyo state.

METHODOLOGY

The study was carried out in Oyo state in the South-Western geo-political zone of Nigeria. Multi-stage stratified sampling technique was used to collect primary data on household characteristics, preference and frequency of fish species purchased with the quantity and amount of money spent of these weekly in the study area. In the first step, all local government areas in Oyo state were identified, and five local government areas were randomly selected. In the second stage, the number of towns were randomly selected. The third stage of the data collection involves stratification of respondents into groups; producers, marketers, and consumers. At the fourth stage, at least 10 respondents were randomly selected each from the producers, each from the marketers and consumers respectively to make a total of 30 respondents from each town to make a total of 151. Selected respondents were either household heads or individuals with substantial knowledge about the family and actively participate in the purchase of goods (fish and fish products) in the study area.

Tobit regression model, and Quadratic Almost Ideal Demand System (QUAIDS) were used. The QUAIDS model is presented as equation 1 below:

$$w_i = \alpha_i + \sum_{j=1}^{n} \gamma_{ij} \ln p_j + \beta_i \ln\left[\frac{m}{a(p)}\right] + \frac{\lambda_i}{b(p)}\left\{\ln\left[\frac{m}{P}\right]\right\}^2 + \mu_i \qquad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Wi = the expenditure shares for commodity. α, b , γ, λ, and η = estimated parameters; and e = error term. Where Yi is the Consumption preference of respondents, Xi's = the preference and behavioural attributes of respondents: X_1 = income level of respondents (Naira), X_2 = age of respondents (year), X_3 = sex or gender of respondents (male or female), X_4= marital status of respondents (married, = 1, otherwise 0), X_5 = household size (number), X_6 = education level of respondents (number of years spent in school), X_7 = price of substitutes (Naira/kg), X_8= increased health concern, X_9= fish preparation method (smoked, dried, fresh, frozen, etc.), X10 = advertisement, X_{11} = distance from home to fish seller or market (kilometres), X_{12}= taste of fish, X_{13} = price of fish (Naira/kg), X_{14} = type of fish (frozen, cultural, processed and captured).

The Tobit regression model was fitted as this:

Yi* = βXi + ei …..…….…… (2)

Where Y is fish preference,

Whereas, Xi's are independent variables which represents:

X_1 = Age of household head (years), X_2 = Educational level of household head (years), X_3 = Household size, X_4= Taste of fish, X_5 = Ease of preparation of fish, X_6 = Safeness to eat fish, X_7 = Freshness of fish, X_8 = Cleanliness of fish, X_9 = Appearance of fish, X_{10} = Odour (smell) of fish, X_{11} = Availability of fish in the open market, X_{12} =Expenditure on substitutes (naira). ei = Error term.

RESULTS AND DISCUSSIONS

Fish consumption preference

The result as shown in Table 1 reveals that frozen tilapia (60.3%), smoked tilapia (66.9%), fresh (cultured) tilapia (79.5%), fresh (captured) tilapia (79.5%) and dried tilapia (51.7%) were strongly preferred by most households. Frozen horse mackerel (52.3%), smoked catfish (37.7%), fresh (cultured) tilapia (19.2%), fresh (captured) catfish (45.7%) and smoked panla (43%) were slightly preferred by most households. Frozen herrings (46.4%), smoked herrings (32.5%), fresh (cultured) catfish (23.8%), fresh (captured) catfish (41.7%) and dried tilapia (19.9%) had the highest indifference level. Smoked herrings and tilapia (9.9%), fresh (captured) croaker (1.3%), and dried catfish (27.2%) were not preferred by households. Frozen hake (82.1%), smoked herrings (25.8%), fresh (cultured) catfish (29.1%), fresh (captured) shark (99.3%) and dried oporoko (68.9%) were most disliked among households. In summary, respondents in Oyo state much prefer Tilapia fish whether it is frozen, smoked, cultured, captured or dried. They also showed some dislike for hake fish, croaker, shark and oporoko fish. This disagrees with the findings of Abiona (2016) in her studies on fish species and forms consumed in both water and non-water bodies of Oyo State, Nigeria.

Table 1: Consumers preference for fish in the study area

		Consumer Preference				
Form of the Fish	**Type of Fish**	**Strongly preferred (%)**	**Slightly preferred (%)**	**Indifferent (%)**	**Not preferred (%)**	**Dislike (%)**
Frozen	Croaker	9.9	6.6	29.1	0	54.3
	Herrings	0	13.2	46.4	0	40.4
	Horse mackerel	26.5	52.3	9.3	0	11.9
	Mackerel	49.7	40.4	9.9	0	0
	Hake	0	0	17.9	0	82.1
	Tilapia	60.3	33.1	5.3	0	1.3
	Catfish	13.9	41.7	20.5	0	23.8
Smoked	Tilapia	66.9	27.8	5.3	0	0
	Herrings	6.5	25.2	32.5	0	25.8
	Horse mackerel	27.8	34.4	25.8	0	11.8
	Mackerel	49.7	29.8	10.6	0	0
	Catfish	49.0	37.7	5.3	0	7.9
Fresh Cultured	Tilapia	79.5	19.2.	1.3	0	0
	Catfish	34.4	12.6	23.8	0	29.1
Fresh Captured	Tilapia	94.7	4.0	1.3	0	0
	Catfish	6.6	45.7	41.7	0	6.0
	Croaker	0	31.1	33.1	1.3	34.4
	Shark	0	0	0	0.7	99.3
Dried	Tilapia	51.7	28.5	19.9	0	0
	Catfish	29.1	39.7	0	27.2	4.0
	Oporoko	0	5.3	15.9	9.9	68.9
	Panla	38.4	43.0	10.6	0	7.9

Source: Data analysis, 2021

Estimating the determinants of fish consumption preference

Table 2 presents the estimation of the various factors affecting fish consumption preference using Tobit regression model. The result shows that the probability of respondent's preference for fish increases with an increase in number years spent in school. This connotes that the more educated the respondents are, the stronger would be their preference for fish. However, there is a probability that the preference would reduce with an increase in age, gender, marital status, income and the prices of different fish forms and that of its substitutes which conforms to the result of Mozammel Mridha (2020). The result shows that if the price of income, price of frozen fish, fresh fish both captured and cultured and price of meet and egg increase by 100%, there would be about 0% increase in the preference for fish. This suggests that residents in Oyo state would not want to but fish if they have more money or if the price of the fish goes up. This somehow indicates that the respondents prefer other forms of protein than fish.

Table 2: Determinants of fish consumption preference

Consumption preference	**Coefficient**	**Std error**	**T**	**P>t**
Age	-0.020	0.031	0.625	0.333
Family size	-0.0034	0..224	-0.15	0.881
Years spent in school	0.0176	0.0315	0.55	0.428
Gender	-0.0308	0.0156	-1.97	0.052
Marital status	-.0233	0.0851	-0.27	0.785
Income	$-2.49e^{-06}$***	$4.61e^{-07}$	5.41	0.000
Price/kg of frozen fish	$1.26e^{-04}$*	$7.56e^{-05}$	1.68	0.097
Price/kg of captured fish	2.98^{-04}	$3.75e^{-04}$	0.80	0.428
Price/kg of cultured fish	$2.49e^{-06}$***	$4.61e^{-07}$	5.41	0.000
Price of beef	$1.33e^{-04}$***	$4.79e^{-05}$	2.79	0.006
Price of egg	$-6.11e^{-04}$***	$2.34e^{-04}$	-2.61	0.007
_Cons	2.3736	0.4485	5.29	0.000
Sigma	0.3732	0.0293		
LR Chi^2	70.46			

Pseudo R^2	0.3515

Please note that *** =1%, ** = 5%, *= 10%
Source: data analysis 2021

Consumption pattern of households towards frozen fish

Table 3 expressed the compensated own price elasticity coefficients, which shows percentage change in demand in response to its own price; Mackerel fish has the highest own price elasticity of (0.44) followed by croaker fish (0.43). This indicates that a one percent increase in the price index led to a rise in demand for mackerel and croaker fish by about 0.45 percent and 0.43 percent, respectively. Therefore, these groups can be interpreted as necessity goods.

Similarly, the compensated cross-price elasticity coefficients for all the fish can be observed from Table 3. It was measured as the percentage change in demand for the first good that occurs in response to a percentage change in the price of a second good. This measure enables us to determine whether two groups are complementary or substitute goods. For croaker fish, mackerel fish and herrings were found as its complement, while others were its substitutes. In the case of herring fish, all other fish complement herrings except mackerel fish. For horse mackerel, only catfish was its substitutes. Others were the complements of horse mackerel fish. On the contrary, hake, tilapia and catfish were complements to mackerel while tilapia fish was a substitute to hake and catfish complements it.

From Table 4, Compensated computes demand elasticity to changes in prices, ignoring income effects. These elasticities are also known as Hicksian price elasticities. Uncompensated computes demand elasticity due to changes in prices. These elasticities are also known as Marshallian price elasticities. The elasticities are computed at the estimation sample means of the prices, expenditures, and any demographic variables. Compensated or Hicksian elasticities in this study as presented in Table 4 were reduced to contain only price effects and compensated for the effect of a change in the relative income on demand. The values of the uncompensated elasticities of the food groups obtained were not lower than the compensated elasticities like Obayelu, et. al., (2009) found out. All own-price elasticities were not negative as stipulated by the apriori expectation. This agrees with the findings of Elzaki et. al., (2021) which shows that a unit increase in the price of the frozen fishes with positive elasticities would bring about an increase in their demand and vice versa if the elastic is negative. The own price elasticity of horse mackerel (compensated and uncompensated) was the smallest in absolute terms, indicating that horse mackerel was the least sensitive to changes in its price.

Table 3: Frozen Fish consumption pattern of households using Quadratic Almost ideal Demand System

Variable Expenditure	Symbols	Croaker	Herrings	Horse Mackerel	Mackerel	Hake	Tilapia	Catfish
Constants	α_i	0.734***	-0.114	0.058	-0.523	0.099	0.522*	0.228
		(0.000)	(0.161)	(0.829)	(0.161)	(0.564)	(0.065)	(0.442)
Prices	β_i	0.436***	-0.187	0.019	-0.443***	0.028	0.1527	-0.006
		(0.000)	(0.114)	(0.883)	(0.009)	(0.727)	(0.254)	(0.966)
Croaker	λ_{i1}	**0.421*** **	0.352	0.013	-0.352**	0.017	0.192	0.610
		(0.000)	(0.003)	(0.919)	(0.048)	(0.833)	(0.137)	(0.660)
Herrings	λ_{i2}		**0.270**	-0.051	0.281**	-0.028	-0.110	-0.100
			(0.016)	(0.472)	(0.028)	(0.580)	(0.185)	(0.905)
Horse mackerel	λ_{i3}			**0.091**	-0.006	-0.018	-0.314	0.003
				(0.275)	(0.970)	(0.669)	(0.654)	(0.969)
Mackerel	λ_{i4}				**0.450**	-0.077	-0.320*	-0.026
					(0.157)	(0.420)	(0.070)	(0.862
Hake	λ_{i5}					**0.090***	0.581	-0.042
						(0.068)	(0.223)	(0.362)
Tilapia	λ_{i6}						**0.230****	-0.018
							(0.048)	(0.827)
Catfish	λ_{i7}							**0.031**
								(0.757)

Source: Data analysis, 2021

Table 4: Price elasticities of frozen fish

Change in quantity	Change in Price Croaker		Herrings		Horse mackerel		Mackerel		Hake		Tilapia		Catfish	
	C	U	C	U	C	U	C	U	C	U	C	U	C	U
Croaker	-0.53	-0.53	-2.14	-2.12	-0.04	-0.02	0.67	0.73	-0.55	-0.05	1.01	1.03	1.09	1.11
Herrings	-1.31	-1.42	0.63	0.43	-0.15	-0.35	1.24	0.75	-0.71	-0.15	-0.35	0.52	0.01	-0.2
Horse mackerel	-0.03	-0.08	-1.14	-2.21	-0.25	-0.33	0.42	0.22	-0.09	-0.13	-0.11	-0.18	0.21	0.12
Mackerel	0.15	0.08	0.49	0.36	0.17	0.03	-0.32	-0.65	-0.10	-0.16	-0.45	-0.57	0.06	-0.09
Hake	-0.08	-0.15	-0.17	-0.29	-0.24	-0.36	-0.64	-0.92	0.69	0.65	1.05	0.95	-0.62	-0.74
Tilapia	0.69	0.57	-0.38	-0.57	-0.12	-0.32	-1.24	1.72	0.47	0.40	0.62	0.44	-0.02	-0.23
Catfish	0.59	0.48	0.01	-0.16	0.19	0.01	0.12	-0.31	0.22	-0.29	-0.12	-0.17	-0.67	-0.86

Note:
C=Compensated price elasticities,
U=Uncompensated elasticities
Source: Data analysis, 2021

Consumption pattern of households towards dried fish

The own price of different types of dried fish is shown in Table 5. Tilapia has 0.71 while catfish, oporoko and panla has 1.60, -0.35 and -0.25 respectively. This means that a one percent increase in the price index of this types of fish causes a drop in demand of oporoko and panla by of 0.35% and 0.25% in the study area and an increase of 0.71% and 1.6% in the demand of tilapia fish and catsfish responsively. This pinpoints than demand was elastic for dried catfish and inelastic for others. For dried tilapia fish, dried catfish was a complement to it while oporoko was a complement to dried catfish and dried panla was a complement to oporoko.

Unlike the findings from Table 4, Table 6 presents the compensated and the uncompensated elasticities of dried fish is Oyo state. The table shows that all own price of the dried fished are negative which conforms to the apriori expectations and further shows that the elasticities are relatively elastic for all the dried fish except for oporoko which is elastic. A similar experience was also observed in the quantity of oporoko that would be purchased when the price of tilapia changes by 1%. This disagrees with the conclusion of Onyeneke et. al., (2020) in their study on the consumption of different forms of fish in abakaliki, Nigeria.

Table 5: Dried Fish consumption pattern of households using Quadratic Almost ideal Demand System

Variable	Symbols	Tilapia	Catfish	Oporoko	Panla
Constant	α_i	-0.702	2.134***	-0.273	-0.196
		(0.326)	(0.003)	(0.442)	(0.643)
Prices	β_i	-0.401	0.720	0.123	-0.196
		(0.262)	(0.074)	(0.413)	(0.643)
Tilapia	λ_{i1}	**0.710**	-1.057	0.228	0.069
		(0.480)	(0.480)	(0.230)	(0.902)
Catfish	λ_{i2}		**1.606**	0.236	-0.313
			(0.436)	(0.540)	(0.799)
Oporoko	λ_{i3}			**-0.035**	-0.006
				(0.802)	(0.973)
Panla	λ_{i4}				**-0.250**
					(0.671)

Source: Data analysis, 2021
Please note that ***=1%, **=5%, *=10%

Table 6: Price elasticities of dried fish

Change in Quantity	Change in Price Tilapia		Catfish		Oporoko		Panla	
	C	U	C	U	C	U	C	U
Tilapia	-0.09	-0.30	-0.05	-0.31	0.44	0.43	-0.30	0.61
Catfish	-0.04	-0.38	-0.96	-1.37	0.18	0.16	0.84	0.37
Oporoko	7.39	7.22	3.59	3.39	-6.18	-6.19	-4.80	-5.05
Panla	-0.22	-0.49	0.71	0.39	-0.20	-0.22	-0.29	-0.67

CONCLUSION AND RECOMMENDATION

This paper presents an analysis of household fish preference and pattern using a cross-sectional data using retested questionnaire. The data was analysed using QUAIDS which generates more stable and realistic elasticities. The results of the QUAIDS model show that own price of all food consumed in the study area is inelastic except

oporoko implying that a percentage change in the quantity of fish consumed in any form is less than the percentage changes in their price. This has serious implication on a household' nutrition security in the study area because majority of these fish are usually imported and the naira to dollar exchange rate is getting eroded by the day. The negative and positive own-prices elasticity of the fish of any form imply that a unit reduction or increase in the price of the fish will increase or decrease its demand. In such a case, there is the need for government at all levels to embark on agricultural policies that will boost local production of these fishes and thus reduce the daily burden of exchange rate and thus reduce their prices in order to enhance access by households. This also expresses that if there is shortage of fish available for consumption in the study area, the price might go up. It was also discovered that respondents in Oyo state preferred tilapia fish in any form and they would prefer other forms of animal protein than fish if they have more money to buy it. The fish available if Oyo state were substitutes and complements to one another. It was also revealed that the respondents in Oyo state would still buy more of dried catfish even if there is an increase in price.

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