

## CONSUMPTION PREFERENCE FOR CULTURED, CAPTURED AND FROZEN FISH IN OGUN STATE

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### ABSTRACT

Consumption preference has been viewed as a veritable tool for a successful investment potential in fisheries study. It is on this premise that this study examines consumption preference for cultured, captured and frozen fish in Ogun State, Nigeria. For this study, primary data were collected from 150 respondents (final consumers) with the aid of semi structured questionnaire in a multistage sampling technique framework. The Data were analyzed using descriptive and inferential statistics. The result of the analysis of consumer preference established a high preference and consumption (frequencies of 46% and 61.2% respectively) for frozen fish over and above captured and cultured fish. Furthermore, the regression analysis showed that the double log has a lead equation with  $R^2$  of 43.4%. Also, age, household size, income and level of education were isolated as determinants of consumption preference for fish. Fish consumption was equally found to be income inelastic. Hence it was suggested that, a cost effective technique of aquaculture, cost-reducing harvesting technique in artisanal fisheries and increased nutritional education could drift consumers towards the consumption of high valued fresh fish. It was equally noted that a policy that increases the income of consumers can only increase fish consumption to a limited extent.

Key Words: Consumption, Preference, Cultured, Captured, Frozen

### INTRODUCTION

Nigeria's animal protein problem has of recent become glaring. The wide discrepancies between total animal protein supply and demand in the country has made meat supply to equilibrate meat demand at prices most Nigerians can ill-afford (Williams and Oramah, 1989). Fish being a cheap and most affordable animal protein to the common man provides up to 40% of animal protein consumed by an average Nigerian (FOS 1990, Fagbenro, 2004). Recently, demand for fish products was reported to double as other animal protein sources become more costly due to pressure on demand by the ever increasing population and the high cost of production of animal protein sources (Ojo and Fagbenro, 2004). The Nigerian government has on realization of this fact started to lay emphasis on fish production in order to contain the protein problem (Kareem *et al.*; 2009). Nigerian aquaculture industries rank second in Africa (Ojo *et al.*, 2006a), though, yet to reach the country's full production potential in term of available natural, environmental and socio-economic factors. The contribution of aquaculture to total fisheries production rose between 7.38% in 1997 to about 10.11% in 2003 (CBN, 2003; Ojo *et al.*, 2006b). Although the demand for fish has been rising rapidly as a result of increases in population, per capital income, and high prices of alternative sources of animal protein, Nigerians have to shift to the consumptions of fish which its production mainly come from artisanal captured fisheries, aquaculture and industrial captured fisheries which is usually in frozen form. It is expected that with increasing aquaculture production and negative acceptability trend of frozen fish, perhaps consumer preference might shift towards the consumption of cultured fish (Ojo and Fagbenro, 2004). This paper therefore examines the consumer preference for products of artisanal captured fisheries, industrial captured fisheries and cultured fisheries (aquaculture) as well as the determinants of these preferences with a view to using the research effort as a guide in the area of fish policy in Nigeria.

## THEORETICAL/CONCEPTUAL FRAMEWORK

### Consumption Preference Theory

The theory of household consumer behaviour is based on the concept of consumer preference and assumed existence of consumer utility functions. The theory assumes that when a consumer is faced with alternative bundles or "baskets" of commodities each of which has some amounts of utility content, he/she will prefer a bundle with higher utility content to one with lower utility content. The consumer utility function defines the satisfaction which can be derived from various commodity bundles within his or her choice range provided every consumer is a utility maximizer and there exist a perfect competition in the market (Olayemi, 2004).

Utility was originally based on the theory of cardinal utility which assumes that utility is measurable on cardinal scale, that is, consumers are assumed to be able to assign numerical utility value to alternative bundles of commodities. This later developed into a simpler concept of ordinal utility and indifference curve. The concept of ordinal utility proposes that the consumer is assumed to be rational enough to at least be able to rank commodities in order of preference (Olayemi, 2004).

This concept is most relevant to this study as preference for different forms of fish; captured, cultured and frozen, is expected to be ranked by respondents in terms of utility or satisfaction derived to determine the consumption preference for such. The indifference curve theory is out of the scope here as the study will not examine the combination of two forms of Products to achieve utility as prescribed by the theory.

For the purpose of this study, the utility function is defined as follows:

$$u_1 = f(q_1, q_2, q_3) \dots \dots \dots (1)$$

Where  $U_1$  = utility derived from fish consumption

$q_1$  = cultured fish

$q_2$  = captured fish (usually in fresh form from artisanal fisheries)

$q_3$  = frozen fish (usually from industrial fisheries)

This could be transformed as

$$u_2 = f(kq_1, kq_2, kq_3) \text{ for } k > 0 \text{ without changing the preference ranking} \dots \dots \dots (2)$$

Above all, the overriding assumption is still that the consumer is rational and has the objective of utility maximization. However, consumptions have been hypothesized to be a function of many factors of which price and income are considered very important. Hence utility maximization is largely constrained by income, price (cost) and other demographic/socioeconomic factors.

### Consumption Function

The consumption curve shown in Figure 1, 2 and 3 represents the simplest expression of consumption function. They simply express the quantity of commodity consumed as a function of income

$$q = f(y)$$

There are three possible rate of change in quantity consumed as income increases. Quantity consumed can either increase at an increasing, constant or diminishing rate. These different rates of increase can be translated directly into income elasticity of demand.

$$\frac{\delta q_i}{\delta y} \cdot \frac{y}{q_i}$$

The value can be greater than unity and this is characteristically of luxury goods. The value can also be less than or equal to unity and this is typical of necessities like food.

Statistical or empirical function often requires some modifications to simple function  $q_i = f(y)$ . The dependent variable  $q_i$  may be expressed as expenditure on  $q_i$  rather than physical quantity of  $q_i$  consumed as done in this study. In addition to income as an independent variable there is often a need to include other variables such as household size; this is also followed in this study, when information on income is difficult to obtain, it often becomes necessary to replace the income variables with expenditure since income and expenditure are correlated but this study used the actual income and not expenditure as explanatory variable.

It is also of importance to note that one of the important laws in Economics is derived from the consumption function analysis as attempted in this study; the Engel's Law which states that the income elasticity of demand (consumption) of luxuries tend to be higher than unity while that of necessities tend to be lower or equal to unity (Olayemi, 2004).

## METHODOLOGY

The study area, Ogun State is located in the tropical region of south west Nigeria. It lies between latitude  $6^{\circ}$  and  $8^{\circ}$ N and longitude  $2^{\circ}$  and  $5^{\circ}$ E. Aside the prominent crop and animal farming practices in the state, the state also harbors some bodies of freshwater which encourages artisanal fishery. It also consists of pockets of pond and earthenware aquaculturist as well as numerous industrial frozen fish depot.

The sampling technique employed a multistage sampling technique in the selection of respondents. In the first stage, Abeokuta town was purposefully chosen in the state. This is because the town is the capital of the state, mostly populated and have market for the three forms of fish in question. Out of the 20 Local Government areas in the state, it covers four local Local Governments areas namely; Abeokuta North and Abeokuta South as a whole and partly Odeda and Obafemi-Owode Local Government. The second stage involved the random selection of 10 enumeration areas from the town while this was followed by the selection of 150 respondents from the enumeration areas by probability proportional to size using the 2006 population data as the baseline. A semi structured questionnaire was designed to elicit relevant information from respondents. In all, 139 regular questionnaires were used for the final analysis. In the analysis, descriptive statistics; frequency tables and percentages and OLS multiple regression were employed.

Multiple regression analysis was used to analyze the factors affecting the consumption preference for fish in the study area. In addition, it enables us to estimate the income elasticity of fish consumption. The range of functional forms that can be used is limited by the constraints imposed by the regression procedure. The form must be linear or capable of being transformed into linear relationship. The forms that have been applied to different consumption studies in the past include the Linear, Double Log, Semi-Log and exponential forms. For this study three different forms were estimated namely; Linear, Semi-Log, and Double Log while the functional forms with the best fit was chosen based on theoretical plausibility, statistical and mathematical criteria. For estimation, the Ordinary Least Square (OLS) method was used. The model is specified thus:

$$y_e = b_0 + b_1x_1 + e \quad \dots\dots\dots(3)$$

Where,

$y_e$  = The dependent variables = expenditure on preferred fish (N)

$b_0$  = The intercept

$b_i$ 's = Coefficients of explanatory variables

$x_i$ 's = Explanatory variables

$e$  = the stochastic term.

Explanatory variables

$x_1$ ----- Age of respondents (Years)

$x_2$ ----- Gender of the respondents (Dichotomous) 1- male 0-otherwise

$x_3$ ----- Level of education (Numbers of years of education)

$x_4$ ----- Household size (Number)

$x_5$ ----- Religion(Dichotomous)1- muslim 0- otherwise

$x_6$ ----- Monthly incomes of the respondents (₦).

The standardized Z score were recorded as coefficients to enable the beta weight of variables comparable.

## RESULTS AND DISCUSSION

### Socio-Economic Characteristics of the Respondents

The socio-economic profile of the respondents is described in table 1. The result of analysis on age revealed that 70.5% of the respondents fall within the age bracket of 21 and 40 years, about 17% of them are between 41 and 60 years while 8.6% falls under 20 years. 61-90 years age range recorded the least frequency of 4.3%. The gender analysis of respondents as presented in table 1 revealed that 52.5% of the respondents were male while the remaining 47.5% constitute females. On religion, 57.6 were Muslims while the remaining respondents were of the Christian faith as shown in table 1. Considering the analysis by profession, 34.8% were private worker. This was followed by 29.07% active civil servants. Traders recorded 23.2% while the artisans and the students recorded 6.5% each. Only 1.4% were retired civil servants. As shown in the table, the level of education of the respondents revealed that majority (79.9%) are products of tertiary institution. 14% of them completed secondary school education while 2.9% and 3.65% were primary school leavers and people with no formal education respectively. The table also showed that 47.5% of the respondent claimed to have 5-10 working members in their family while 15.8%, 13.7% and 12.2% were recorded frequencies for 11-14, 15-20 and 1-4 working members respectively. Furthermore 71.2% of the respondents do not belong to any social organization while 28.8% are members of one social organization or the other as seen in table 1. In addition, half of those who belongs to social organization only participate in one or two organizations (Table 1)

### Consumption Preferences

Table 2 reveals the consumption preference of the respondents; it was shown that frozen fish ranks highest in terms of consumption preference as well as real consumption. This is evident from the 46.0 and 61.2% recorded for preference and consumption respectively. Cultured fish ranks next in consumption preference (28.1%) while captured fish recorded the least frequency (23.3%). About 3.6% of the respondents were indifferent to the fish form. In terms of the most consumed fish, a slight deviation was observed in relation to consumption preference, next to frozen fish, captured fish was more consumed recording 20.1% frequency while cultured fish closely followed with 18.7% score. The study also showed that majority of the respondents often buy and eat their preferred fish weekly as depicted from the recorded percentages of 51.8 and 43.2 for purchase and consumption respectively. 30.9% of them eat their preferred fish daily while the remaining percentages are split between those who eat monthly and others (unspecified). It was also observed from the results that many respondents (56.1%) have at one time or the other tried their unpreferred fish and as much as 34.5% of them still intended to consume more of their unpreferred fish. It is interesting to note that few of them still considered the taste of their unpreferred fish to be good. Also 65.55% of the respondents prefer whole fish while others prefer fillets. Considering the cost of their preferred fish as shown in table 2, many respondents (38.8%) put it at ₦200-400/Kg. Some (26.6%) quoted less than ₦200. Others (25.9%) put it at ₦401-600/Kg while the rest of the

respondents quoted between ₦601 and ₦12, 000. Since many considered frozen fish as cheaper than the others, this may have also accounted for the high preference and consumption of frozen fish. The analysis of the result on distance from fish markets point to the fact that 39.1% of the respondents have their homes at little available distance from frozen fish market as against the 33.8% and 30.2% for the cultured and captured fish respectively. It could also be deduced from this result that the favorable distance factor also accounts for the preference for frozen fish in the study area. Finally, 51.1% of the respondents earn less than ₦ 55, 000 monthly while a mere 13.7% earn above ₦100, 000 monthly. This imply a generally low income on the part of the respondents and this could also contribute to preference for and consumption of cheap and affordable fish as evident from the high preference for frozen fish in the study area.

#### Determinants of Consumption Preference

The result of the OLS multiple regression as shown in table 3 estimated value of 43% for the coefficient of multiple determination of fish consumption. This shows that the factors that enter the regression model accounted for 43% of the variation in household monthly expenditure on preferred fish. The result of the double log regression model was so chosen because its beta value yields a direct estimate of elasticity. The value of  $R^2$  is significant at 1% ( $P \leq 0.001$ ) given the F-value of 16.284. Similar to the semi-log function, four factors were also found to be significant ( $P \leq 0.001$ ) as against three significant factors for the linear function. The value of  $R^2$  so gotten is substantial and typical of a consumption function. Consumption functions have mostly been found to be non-linear in past studies; this also informs the choice of double-log function.

The level of education, household size and income of respondents were found to be highly significant at 1% ( $P \leq 0.001$ ). The age of the respondents was also significant at 5% ( $P < 0.05$ ). All the aforementioned factors showed positive correlation with the dependent variables (monthly expenditure on preferred fish). This implies that a unit increase in the age of respondents will lead to a corresponding increase on expenditure of the preferred fish by a factor of 0.15. Equally an increase in level of education, household size and income of respondents by a unit will lead to a corresponding increase in expenditure on preferred fish by a factor of 0.198, 0.212 and 0.520 respectively. It therefore follows that consumption preference for various fish could be influenced by the manipulation of the four significant variables aforementioned. It is also of importance to note that consumption preference for fish is income inelastic. The double log gives a direct estimate as 0.520 which is less than unity. This is in consonance with Engels law that additional income increases necessity consumption up to a certain point until it no longer has effect on their consumption. This is simply because consumer (low income populace) spend a large proportion of their income on food but when incomes become high and households have met their food requirements, there will not be need to consume more and hence they shift to the consumption of luxuries. More so, this study has earlier revealed that most of the respondents are of low and medium income group hence consumption is still expected to be influenced by increase in income as shown in the study. Fish consumption is thus classified and confirmed as a necessity since the elasticity is less than unity (0.52).

#### CONCLUSION AND RECOMMENDATION

Age, household size, income and level of education are the determinants of fish consumption preference in Ogun State. Consumption of fish is also income inelastic. Hence, it was concluded that policy that increases the income of consumers may drive them towards the consumption of fresh fish until unity is reached. Also a cost effective technique in aquaculture practice or cost-reducing harvesting technique in artisanal fisheries that could bring down the price of cultured and captured fish could drift consumers towards the consumption of fresh fish. The availability of cultured and captured fish at area not far from consumers could also go a long way in stimulating preference and consumption of fresh fish. Finally, the

level of education will also enlighten people on the nutritional value of fish and enable them to consume more of high valued fish.

Table 1: Socio-economic Characteristics of the Respondents

| Socio-economic variables           | Frequencies (N=139) | Percentage (%) |
|------------------------------------|---------------------|----------------|
| Sex                                |                     |                |
| Male                               | 73                  | 52.5           |
| Female                             | 66                  | 47.5           |
| Age                                |                     |                |
| <20 years                          | 12                  | 8.6            |
| 21-40 years                        | 98                  | 70.5           |
| 41-60 years                        | 23                  | 16.5           |
| 61-90 years                        | 6                   | 4.3            |
| Religion                           |                     |                |
| Christianity                       | 59                  | 42.4           |
| Islam                              | 80                  | 57.6           |
| Level of Education                 |                     |                |
| None at all                        | 5                   | 3.6            |
| Primary                            | 4                   | 2.9            |
| Secondary                          | 19                  | 13.7           |
| Tertiary                           | 111                 | 79.9           |
| Profession                         |                     |                |
| Trader                             | 32                  | 23             |
| Artisan                            | 8                   | 5.8            |
| Civil Servant                      | 40                  | 28.8           |
| Private worker                     | 48                  | 34.5           |
| Students                           | 9                   | 6.5            |
| Retired                            | 2                   | 1.4            |
| No of Working Members              |                     |                |
| 0                                  | 1                   | 0.7            |
| 1-4                                | 17                  | 12.2           |
| 5-10                               | 66                  | 47.5           |
| 11-14                              | 22                  | 15.8           |
| 15-20                              | 19                  | 13.7           |
| 21-25                              | 14                  | 10.1           |
| Membership of Social Organization  |                     |                |
| No                                 | 99                  | 71.2           |
| Yes                                | 40                  | 28.8           |
| No of Social organization Involved |                     |                |
| None                               | 100                 | 71.9           |
| 1-2                                | 19                  | 13.7           |
| 3-4                                | 11                  | 7.9            |
| 4-5                                | 2                   | 1.4            |
| 5-6                                | 6                   | 4.3            |
| 7 and above                        | 1                   | 0.7            |

Table 2: Consumption Preferences

| Consumption variables                          | Frequencies (N=139) | Percentage (%) |
|------------------------------------------------|---------------------|----------------|
| Most preferred fish                            |                     |                |
| Cultured fish                                  | 39                  | 28.1           |
| Captured fish                                  | 31                  | 22.3           |
| Frozen fish                                    | 64                  | 46.0           |
| Indifferent                                    | 05                  | 3.6            |
| Most consumed fish                             |                     |                |
| Cultured fish                                  | 26                  | 18.7           |
| Captured fish                                  | 28                  | 20.1           |
| Frozen fish                                    | 85                  | 61.2           |
| Frequency of purchase of preferred fish        |                     |                |
| Daily                                          | 22                  | 15.8           |
| Weekly                                         | 72                  | 51.8           |
| Monthly                                        | 28                  | 20.1           |
| Others                                         | 17                  | 12.2           |
| Frequencies of consumption of preferred fish   |                     |                |
| Daily                                          | 43                  | 30.9           |
| Weekly                                         | 60                  | 43.2           |
| Monthly                                        | 21                  | 15.1           |
| Others                                         | 15                  | 10.8           |
| Trying un-preferred fish                       |                     |                |
| No                                             | 61                  | 43.9           |
| Yes                                            | 78                  | 56.1           |
| Taste of preferred fish                        |                     |                |
| Excellent                                      | 69                  | 49.6           |
| Good                                           | 65                  | 46.8           |
| Fair                                           | 02                  | 1.4            |
| Poor                                           | 03                  | 2.2            |
| Taste of un-preferred fish                     |                     |                |
| Excellent                                      | 0                   | 0              |
| Good                                           | 22                  | 15.8           |
| Fair                                           | 83                  | 59.7           |
| Poor                                           | 34                  | 24.5           |
| Intention to consume more of un-preferred fish |                     |                |
| No                                             | 91                  | 65.5           |
| Yes                                            | 48                  | 34.5           |
| Cost of Preferred fish (N/Kg)                  |                     |                |
| <200                                           | 37                  | 26.6           |
| 201-400                                        | 54                  | 38.8           |
| 401-600                                        | 36                  | 25.9           |
| 601-800                                        | 2                   | 1.4            |
| 801-1000                                       | 3                   | 2.2            |
| 1001-1,600                                     | 3                   | 2.2            |
| >2,000                                         | 4                   | 2.9            |
| Fish Bought                                    |                     |                |
| Fillets                                        | 48                  | 34.5           |
| whole                                          | 91                  | 65.5           |
| Distance from Cultured Fish Farm               |                     |                |
| Few available distance                         | 47                  | 33.8           |
| A bit far                                      | 58                  | 41.7           |
| Far                                            | 09                  | 6.5            |
| Very far                                       | 25                  | 18.0           |
| Distance from frozen fish shop                 |                     |                |
| Few available distance                         | 54                  | 38.8           |
| A bit far                                      | 55                  | 39.6           |
| Far                                            | 17                  | 12.2           |
| Very far                                       | 13                  | 9.3            |
| Distance from Captured Fish Farm               |                     |                |
| Few available distance                         | 42                  | 30.2           |
| A bit far                                      | 58                  | 41.7           |
| Far                                            | 18                  | 12.9           |
| Very far                                       | 21                  | 15.1           |

Source: Field Survey, 2008

Table 3: Multiple Regression Results of the Determinant of Consumption Preference for Fish

| Variables          | Linear            |          | Semi-Log          |          | Double Log         |           |
|--------------------|-------------------|----------|-------------------|----------|--------------------|-----------|
|                    | Coeff             | t-val    | Coeff             | t-val    | Coeff              | t-val     |
| Constant           | -0.210<br>(0.975) | -0.21    | -0.177<br>(0.316) | -0.558   | -2.786<br>(0.946)  | -3.732*** |
| Age                | 0.09<br>(0.011)   | 1.248    | 0.150<br>(0.003)  | 1.966**  | 0.131<br>(0.132)   | 1.964**   |
| Gender             | -0.034<br>(0.232) | -0.534   | -0.043<br>(0.075) | -0.645   | -0.410<br>(0.107)  | -0.617    |
| Level of Education | 0.135<br>(0.370)  | 1.903**  | 0.198<br>(0.012)  | 2.669*** | 0.264<br>(0.202)   | 3.879***  |
| Household Size     | 0.179<br>(0.102)  | 2.732*** | 0.212<br>(0.033)  | 3.100*** | 0.210<br>(0.102)   | 3.133***  |
| Religion           | 0.042<br>(0.236)  | 0.655    | 0.000<br>(0.077)  | -0.001   | -0.019<br>(-0.110) | -0.283    |
| Income             | 0.592<br>(0.000)  | 8.894*** | 0.520<br>(0.000)  | 7.504*** | 0.496<br>(0.010)   | 7.265***  |
| R <sup>2</sup>     | 0.471             |          | 0.425             |          | 0.434              |           |
| F-value            | 19.57             |          | 16.284            |          | 17.464             |           |

\*\*\* Values significant at 1% (P<0.01)

\*\* Values significant at 5% (P<0.05)

Source: Field Survey, 2008

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