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ASSESSMENT OF FACTORS AFFECTING RURAL HOUSEHOLD DEMAND FOR FISH IN OYO STATE, NIGERIA

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ABSTRACT

In Nigeria, the greatest problems confronting a large proportion of rural households today is lack of adequate protein intake both in quality and quantity. Hence, factors affecting rural household's demand for fish in Oyo State, Nigeria was investigated. A multistage sampling technique was used using Oyo State Agricultural Development Programme (ADP) classification and zoning structure. Five blocks were selected from each of the stratum (water and non-water body blocks). Simple random sampling was used to select 20 villages from the non-water bodies while purposive sampling method was used with random selection of 20 villages on basis of proportionate to size from the water body. Thus, 125 households were sampled from each stratum, making a total of 250 households sampled. Fish expenditure data were collected quarterly on information on socio-economic characteristics of income and expenditure on fish, types and quantities of fish consumed. Data obtained were analyzed using descriptive statistics and probit regression model at 5% significant level. Farming activity (70.0%) dominated as primary occupation of the respondents while craft work (37.4%) is the secondary occupation. Mean annual income was (₦173,388.00 ± ₦69,709.19) while the mean annual expenditure was (₦142,080.00 ± ₦62,784.08). Probit analysis showed that price of marine (β= -0.47, β = 0.50), cultured (β = -0.22, β = 0.48) and captured fresh water fish species (β = 0.68, β = -0.99) significantly influenced household demand for fish in water and non-water bodies respectively. The demand for fish is affected by the production environment, and closeness to water bodies. Price positively influenced demand for fish species in both seasons; however more fish were generally consumed in dry season. The determinant of fish consumption demand revealed that for a unit increase in the capital household income expenditure leads to an increase in the fish consumption demand. The marine fisheries showed that the household income and its square term are not significant and implies that a unit increase in the household income expenditure does not affect the fish consumption demand for marine fish. The study recommends large scale production of fish through modern techniques, more enlightenment on nutritional value of fish and proper funding of the sector.

Keywords: Protein intake, Fish demand, Multistage sampling, Annual income, Rural household

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INTRODUCTION

Fisheries have been the major source of supply of the necessary protein in household diet in Nigeria (Ogunniyi *et al.,* 2012). Out of an estimated 150 million people in Nigeria (National Population Census, 2006), about 1 percent engages in fishing with over 24 million Nigerians depending on fisheries for their livelihood. According to Amao *et al.* (2006), fish contributes only 3.6g per day in the net protein utilization in Nigerian homes, a level

still below the recommended requirement by the World Health Organization .The short fall is not because of the non-availability of the resources but due to non-maximization and sustainable utilization of available aquatic resources. According to Amao *et al*. (2006), Nigeria has over 12.5 million hectare of inland water capable of producing over 350,000 metric tonnes of fish annually. The demand for fish, mostly low-valued fish, outstrips the local production.

With the decline in capture fisheries, and aquaculture meeting only about 7.6% of the country's current estimated fish demand of 2 million metric tons (annual), the shortfall is being addressed by imports. The country imports roughly 746,851 metric tons of frozen fish, and even then the overall demand has not yet been completely satisfied. Moreover, almost all imports are frozen and of species that are either exotic or high value. Nigeria imported close to US$900 million worth of fish in 2009, sourced from the EU, South America, South Pacific zone and African countries such as Mauritania and Senegal. In addition to frozen and fresh fish, Nigeria also imported approximately US$400 million worth of processed (dried) fish through Scandinavian suppliers.

The combination of Nigeria's large population with an annual growth rate of over 3 percent, high meat/poultry prices, and rising incomes are driving the demand for fish consumption. The demand for captured fish species is especially strong. However, with both marine and fresh water catches declining, local consumers are turning to farmed fish. The national preference is for the fresh indigenous African mud catfish (*Clarias gariepinus, Heterobranchus*, and their hybrid), Nigeria's fish of choice. Despite strong consumer demand for fresh local species, aquaculture production remains small, and has been unable to meaningfully tap the enormous opportunity that exists for Nigeria. Fish and fishery products represent a very valuable source of protein and essential micronutrients for balanced nutrition and good health. In 2009, fish accounted for 16.6 percent of the world population's intake of animal protein and 6.5 percent of all protein consumed. Globally, fish provides about 3.0 billion people with almost 20 percent of their intake of animal protein, and 4.3 billion people with about 15 percent of such protein (FAO, 2008). Differences among developed and developing countries are apparent in the contribution of fish to animal protein intake. Despite the relatively lower levels of fish consumption in developing countries, the share contributed by fish was significant at about 19.2 percent, and for Low Income Food Deficit Countries (LIFDCs) it was 24.0 percent. However, in both developing and developed countries, this share has declined slightly in recent years as consumption of other animal proteins has grown more rapidly (Mafimisebi, 2012).

Consequently, FAO (2007) reported that, many rural dwellers are malnourished and a lot are undernourished. The report further stress that food intake of majority of rural dwellers is mainly carbohydrates (such as rice, maize, cassava) and low proportion of other important nutrients like protein, minerals and vitamins. Protein malnutrition is still wide spread in Nigeria affecting vulnerable groups. These include infants, pre-school children, pregnant and nursing mothers and adults particularly from low income households (Amao *et al.*, 2006). Most (>70%) of the proteins consumed in Nigeria are from the plant sources because of their relative cheapness (Mafimisebi, 2012). Thus, there is a woefully inadequate consumption of high-quality animal proteins and pervasive protein deficiency problems nationally. This has necessitated the on-going campaign for increased ingestion of high-quality animal proteins which can be

more cheaply sourced from fish (Agbogidi and Okonta, 2007).

A number of factors have been adduced for the short fall in protein intake in Nigeria (Mafimisebi, 2011). Chief among these is poverty while others include ignorance, inadequate preservation and processing technologies and cultural/religious beliefs. Fish constitutes an important component of many Nigerian dishes with a projection of an annual consumption rate of about 2.35 million metric tons (Adewumi and Fagbenro, 2010). This high consumption value has been traced to the wide availability and relative cheapness of fish in comparison with other protein sources. Fish contains a high level of protein (17-20%) with an amino acid profile similar to that of land animals (Evangelos, 2010). However, fish consumption of rural households is still below the required standard.

Most low income households assume that fish is meant for the adult members of the family; hence, nutrition problems still persist most especially among the young ones. Recent surveys show that one out of five persons is undernourished and that hunger, malnutrition and serious health problems are still inherent in many parts of Nigeria (Adeniyi *et al*., 2012).

The greatest challenge facing policy makers in Nigeria is how to improve household food intake. This is in terms of the quality and quantity of diet as well as to address the problem of nutritional imbalance of the teeming population of the country (Abdulahi, 2009). Thus, understanding the demand side of the issue is imperative. This was the motivation for this study, which assesses the factors affecting consumption in rural households' demand for fish in Oyo State. The following specific objectives were addressed:

i. To examine household income of the household heads in the study area.
ii. To assess factors affecting rural household demand for fish types in water and non-water body in Oyo State.

METHODOLOGY

Study Area, Sampling Techniques and Data Collection: The study area is the rural communities of Oyo State, located in South western part of Nigeria. The State is the most urbanized in the whole of the federation. The state comprises of 33 local governments and is an important commercial center in Nigeria.

A Multi-stage sampling technique was employed using the four zones of Oyo State Agricultural Development Programme (ADP) classification. In the first stage, 30% of the local governments in the four zones of ADP in Oyo State were selected, from the existing 33 local governments to make a total of 10 dominantly rural local governments sampled. Five blocks were selected from each of the stratum (water body and non-water body blocks) using simple random sampling method for selection of non-water body blocks while purposive sampling method was used to select water body blocks, (because of prevalence of water bodies adjacent to the villages in the study area) in the four administrative zones of Oyo State ADP. The second stage of the selection process involved simple random sampling of 20 villages from the non-water bodies, while random selection of 20 villages were selected on basis of proportionate to size from the water body. In the third stage, proportional sample of 0.24% and 0.19% from a total of 51,865 and 66,243 households' members respectively were used to select 125 households from both the water and non-water body villages, thus making a total of 250 households. In other to assess the factors affecting rural households' demand for fish species, probability of

factors affecting households' demand was modeled by maximum likelihood probit.

Fish expenditure data were collected quarterly for a period of eighteen months. The data collected include information on socio – economic characteristics of households, household income and expenditure on fish consumed. In the analysis of factors affecting rural household demand for fish in water and non-water body in Oyo State the use of probit model was employed. The probability of household affecting demand was modeled by Maximum Likelihood probit, from which the inverse Mill's ratios was estimated to account for selectivity bias which could arise from zero consumption, reported on this study. The zero expenditure on fish could be either as a result of non-purchase during the period of the survey or as a result of corner solution.

Demand equation (probit regression):

$Z_i = w_i \gamma + \upsilon_i$ - - - - -- - - - - - - - - (i)

Where:-

Z_i = 1, if a household consume fish or any of its products; 0, otherwise.

w_i = vector of explanatory variables; (i = 1, 2, -- - - - - -10)

Therefore:-

W_1 = Ln of per capita households income (LNPCHHI)

W_2 = Square of per capita households income (SQPCHHI)

W_3 = household size (HHSZ): (number of persons in households)

W_4 = proportion of children to workers in the households (PCHTWHH)

W_5 = Season (SSN): (rainy and dry); (dry season = 1, 0 = rainy season)

W_6 = Water body (WB) (0=water body, 1= non-water body).

W_7 = Household head education (HHHEDU) (years of formal education of households head)

W_8 = Household head age (HHHAGE) (in years)

W_9 = Household head occupation (HHHOCUP) (farming=1, 0=otherwise)

W_{10} = Ln fish expenditure (LNFEXP)

γ = vector of the coefficient estimates

υ = error term

RESULTS AND DISCUSSION

Annual Household Income: The major factor that closely affects fish consumption is disposable income of individual households. Therefore, income is one of the strongest factors influencing the demand for a commodity. Distribution of annual income of household heads is presented in Table 1. The result shows that majority (59.2%) of the respondents received N100,000 to ₦199,999 annual income while 34.8% of the respondents received ₦200,000 to ₦299,999 as annual income. However, the result shows that 34.8% and 24.4%of the household heads with annual income of ₦100,000 to ₦199,999 were in the water body and non-water body respectively. This was followed by the next annual receiver with ₦200,000 to ₦299,999 in the same water body. Only 1.2% households of respondents receive ₦300,000 to ₦400,000. The table also shows that 24.4% of the respondents which is the majority of households in the non-water body received between ₦100,000 to ₦199,999, while 20.8% received between ₦200,000 to ₦299,999. The least money received as annual income in the water body and non-water body communities is between ₦100,000 to ₦199,999 while the highest money received is greater than ₦400,000. However, income level of household heads is a major determinant of fish demand.

Table 1: Distribution of annual income of household heads

Annual Income (₦)	Water body	Non- Water body	Total
<100,000	0 (0.0)	9 (3.6%)	9 (3.6%)
100,000-199,999	87 (34.8%)	61 (24.4%)	148 (59.2%)
200,000-299,999	35 (14.0%)	52 (20.8%)	87 (34.8%)
300,000-400,000	3 (1.2%)	0(0.0%)	3 (1.2%)
>400,000	0 (0.0%)	3 (1.2%)	3 (1.2%)
Total	**125 (50.0%)**	**125 (50.0%)**	**250 (100.0%)**

Source: Field Report, (2017).

Weekly Proportion of Fish Consumed by households in relation to Total Food Commodities: The weekly proportion of fish consumed in relation to total food and non-food commodities, in water and non-water bodies between rainy and dry season is as shown in Table 2. The fish expenditure in water body communities during the rainy season showed a mean of 9.0% (₦500.25) and 10.6% (₦600.20) in the non-water body; while about 90.9% ((₦3,760.88) was incurred on other food expenditure during the rainy season in the water body. About 80.3% (₦3483.79) was spent during the rainy season on other food expenditure of the non-water body. However, the fish expenditure showed that more money was spent during dry season in both water body and non-water body. Similarly, more money was spent on other food expenditure in the dry seasons of both water and non-water body. This shows that fish consumption varies across purchase occasion, with some consumers eating fish for special occasions while others eat fish more regularly.

It can be deduced that the weekly proportion of fish expenditure by the households during the rainy season is less than the other food expenditure during the dry season. The overview summary revealed that the other food expenditure was regarded as necessities notwithstanding the fact that fish is an important food item, and that there are substitutes to fish. This is because other food commodities were highly essential for the households and have no substitute; therefore, they incurred expenses on the households. In addition, a moral obligation to eat fish can result in internal conflict if some household members do not like fish (Verbeke and Vackier, 2005).

Table 2: Weekly proportion of fish consumed in relation to total food commodity

Type of Expenditure	Water body		Non-water body	
	Rainy Season (%)	Dry Season (%)	Rainy Season (%)	Dry Season (%)
Fish Expenditure	9.0 (₦500.25)	10.9 (₦450.01)	10.6 (₦600.20)	12.6 (₦500.03)
Other Food Expenditure	90.9(₦3760.88)	89.0 (₦2890.19)	80.3 (₦3483.79)	87.3 (₦2625.76)
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: Field Report, (2017). Mean values in parenthesis.

Factors Affecting Rural Household's Demand for Marine Fish Species In Water Body Communities: Table 3 shows the estimates of probit regression for factors affecting rural households' demand for marine fish species in water body communities using probit regression. It revealed that the price of marine fish were significant ($p < 0.01$) in both dry season and rainy season and also in the entire sample with negative coefficients of -0.47, 0.17 and -0.16 in the dry season, rainy season and the

entire sample respectively, which suggest that a unit decrease in the price of marine fish lead to an increase in the demand for marine fish in dry season and the entire sample. Meanwhile a unit increase in the price lead to an increase in the demand for marine fish species in the rainy season. The per capita household income and its square term are not significant ($p > 0.01$) in all the seasons and the entire sample. The square term of the per capita household income revealed negative coefficients of -0.06, -0.05 and -0.05 in dry season, rainy season and the entire sample respectively. These showed that a unit decrease in the household income lead to a decrease in the demand for marine fish in both seasons and the entire sample.

It revealed that the household head size was not significant ($p > 0.05$) in both rainy and dry season and the entire sample, with coefficient of 0.01, 0.01 and 0.00 in dry season, rainy season and entire sample respectively. It showed that a unit increase in the household head size lead to decrease in the demand for marine fish in the dry season, rainy season and also in the entire sample. The proportion of children to household size were significant ($p < 0.05$) in both rainy season and the entire sample but not significant ($p > 0.01$) in the dry season. Coefficients of 0.12, 0.55 and 0.38 in dry season, rainy season and the entire sample respectively imply that a unit increase in the children ratio leads to a decrease in the demand for marine fish in the dry season, an increase in the rainy season and the entire sample. This confirms the work done by Myrland et al., (2010), that the presence of children within the household has a positive impact on fish demand due to different perceptions of taste, smell and freshness.

Time-quarter was significant ($p < 0.05$) in both rainy and dry season with coefficient of 0.04, -0.02 and 0.01 in rainy season, dry season and the entire sample respectively. There was significant ($p < 0.05$) effect of environment (both water body and non-water body) on demand for marine fish in both dry season and rainy season. It depicts that there were much demand for marine fish consumption in the water body communities during the dry season than non-water body environment and there were more demand for marine fish consumption in the non-water body during the rainy season than in the water body environment.

Household head education were significant ($p < 0.05$) in both dry season and the entire sample but not significant ($p < 0.05$) in the rainy season. It revealed the coefficient of -0.02, -0.01 and -0.02 in dry, rainy and the entire sample respectively. The higher the educational background of the household the more the demand for marine fish consumption in the rainy season and the entire sample, while the less the demand for marine fish on the dry season. This also confirmed studies by Verbeke and Vackier (2005) that higher education levels have been found to lead to higher purchase intention because more educated people are less likely to consider price or taste as barriers to eating fish.

Household head age were also significant ($p < 0.05$) in the rainy season only, with negative coefficient in all the season and the entire sample, suggesting that younger people demand for more marine fish than older ones in the rainy season. This agrees with Olsen and Ruiz, (2008), which revealed that children and teenagers influenced household fish consumption. Moreover, household occupation were not significant ($p>0.05$) in both season and the entire sample with coefficient of 0.00, -0.03and -0.02 in dry season, rainy season and the entire sample respectively, which imply that the better the occupation of the household the less they demand for marine fish.

Table 3: Estimate of Probit regression for factors affecting rural households' demand for marine fish species

Independent variables	Dependent variables					
	Expenditure share of marine fish species					
	Dry season Coefficient (SE)	z-value	Rainy season coefficient (SE)	z-value	Entire sample coefficient (SE)	z-value
CONST	0.35 (0.18)	1.92	0.35 (0.18)	1.95	0.35 (0.14)	2.48
LNPMARF	-0.47*** (0.07)	-6.48	0.16** (0.04)	2.25	-0.16 (0.05)	-3.04
LNPCHHI	0.04 (0.05)	0.83	0.08** (0.04)	2.06	0.06 (0.03)	2.12
LNSQPCHHI	-0.06 (0.04)	-1.49	-0.51 (0.04)	-1.36	-0.05 (0.03)	-1.72
HHHSIZE	0.01 (0.01)	0.05	0.05 (0.01)	1.25	0.00 (0.01)	0.45
CHDR	0.12 (0.09)	1.34	0.55*** (0.08)	6.38	0.38 (0.06)	5.86
TIMEQTR	0.04*** (0.01)	4.73	-0.01* (0.01)	-1.87	0.01 (0.01)	1.65
WB	-0.18*** (0.04)	-4.34	0.18*** (0.04)	4.39	0.00 (0.03)	0.08
HHHEDU	-0.02** (0.01)	-2.76	-0.01 (0.01)	-0.76	-0.02 (0.01)	-2.79
HHHAGE	-0.01 (0.01)	-0.42	-0.01*** (0.00)	-3.49	-0.00 (-0.00)	-1.84
HHHOCUP	0.01 (0.04)	0.06	-0.03 (0.04)	-0.74	-0.02 (0.03)	0.93
IMR	-0.05 (0.09)	-0.47	0.24** (0.08)	3.22	0.11 (0.06)	1.69

Source: Data Analysis, (2017). *** = 1% significant level; ** = 5% significant level; and

- = 10% significant level.

Factors affecting Rural Households Demand for Cultured Fish Species in Dry Season and Rainy Season and the Entire Sample: The estimates of probit regression for factors affecting rural households' demand for cultured fish species in dry season, rainy season and the entire sample using probit model is as presented in Table 4. It showed that the price of cultured fish were highly significant ($p < 0.05$) in both dry season and rainy season and in the entire sample. The negative coefficients of -0.22, -0.21 and 0.46 in the dry season, rainy season and the entire sample respectively, suggest that a unit decrease in the price of cultured fish lead to an increase in the demand for cultured fish in both dry season and rainy season.

The per capita households' income and its square terms were significant ($p < 0.01$) in the rainy season and the entire sample in the demand for cultured fish with positive coefficients of 0.03, 0.11 and 0.08 in the dry, rainy and the entire sample respectively. It implies that a unit increase in the household income leads to an increase in the demand for cultured fish in the rainy season and the entire sample, but leads to a decrease in the demand during the dry season. The household head size was not significant ($p > 0.05$). It revealed that a unit decrease in the head size lead to a decrease in the demand for cultured fish in the dry season and in the rainy season.

Children ratio dependency were also significant ($p < 0.05$) in the rainy season but not significant in the entire sample and in the dry season with coefficients of 0.02, -0.18 and -0.13 in the dry season, rainy season and the entire sample respectively. It infers that a unit increase in the ratio of children in the household lead to a decrease in the demand for cultured fish consumption during the dry season, rainy season and the entire sample. This also confirms research by Olsen and Ruiz (2008), that children and teenagers influenced household fish consumption. Time-quarter were not significant ($p>0.05$) in the dry season and the entire sample but significant ($p < 0.05$)

in the rainy season with coefficient of -0.02, 0.02 and 0.00 in dry, rainy season and the entire sample.

Water body were significant ($p < 0.05$) in both dry and rainy seasons, but not in the entire sample. It shows that the household in the water body environment demand for more cultured fish during the dry season than in the rainy season, while the household in the non-water body demand for more cultured fish during the rainy season than in the dry season. The above reasons have also been found to be positively related to the availability of fresh fish (Rortveit and Olsen, 2009).

Household head education were also significant ($p<0.01$) in the dry season with coefficient of 0.02, but not significant ($p>0.05$) in the rainy season and the entire sample with coefficient of -0.01 and 0.01 respectively. Age and occupation do not significantly affect the demand for cultured fish in both rainy season, dry season and the entire sample. .

Table 4: Estimate of Probit regression for factors affecting rural household's demand for cultured fish species

Independent variables	Dependent Variables					
	Expenditure Share of Captured Fish Species					
	Dry season coefficient (SE)	z-value	Rainy season coefficient (SE)	z-value	Entire sample coefficient (SE)	z-value
CONST	0.39** (0.17)	2.32	0.63*** (0.12)	5.17	0.54 (0.10)	4.91
LNPCULF	-0.22*** (0.04)	-5.18	-0.21*** (0.04)	-5.18	0.46 (0.03)	14.45
LNPCHHI	-0.12** (0.04)	-2.88	-0.02 (0.02)	-0.46	-0.06 (0.03)	-2.09
LNSQPCHHI	0.03 (0.04)	0.83	0.12*** (0.03)	4.08	0.08 (0.03)	3.38
HHSIZE	-0.01 (0.01)	-1.36	0.02* (0.01)	1.75	0.00 (0.00)	0.25
CHDR	0.01 (0.08)	0.21	-0.19** (0.07)	-2.88	-0.13 (0.05)	-2.34
TIMEQTR	-0.02** (0.01)	-2.13	0.02** (0.06)	3.36	0.00 (0.00)	0.61
WB	0.13*** (0.04)	3.51	-0.09** (0.03)	-3.02	0.01 (0.02)	0.52
HHHEDU	0.02*** (0.01)	3.10	-0.01 (0.01)	-1.61	0.01 (0.04)	1.36
HHHAGE	0.02 (0.02)	1.17	-0.01 (0.01)	-0.28	-0.05 (0.01)	-0.03
HHHOCUP	0.04 (0.04)	1.08	-0.05* (0.03)	-1.81	-0.06 (0.02)	-0.27
IMR	0.03 (0.09)	0.30	-0.63 (0.06)	-1.09	0.01 (0.05)	0.17

Source: Data Analysis, (2017).
SE = Standard error. *** = 1% significant level; ** = 5% significant level; and
* = 10% significant level.

Factors Affecting Rural Household's Demand for Captured Fresh Water Fish Species in Dry Season, Rainy Season and the Entire Sample: The estimates of the parameters of the seasonal analysis of factors affecting rural household demand for captured fisheries in dry season, rainy season and the entire sample using probit model is as shown in Table 5. It revealed that the price of captured fresh water fish were significant ($p < 0.05$) in the dry season, but not significant in the rainy season and the entire sample. It showed coefficients of 0.68, 0.04 and -0.04 in dry season, rainy season and entire sample respectively. That is, unit increase in the price of captured fresh water fish would decrease the demand for captured fresh water fish during the rainy season and would also lead to an increase during the dry season.

The Ln per capita households' income and its square terms were not significant ($p>0.05$) on captured fresh water fish during the dry season, rainy season and the entire sample. Coefficients of 0.03, -0.06 and -0.03 on its square term, implies that a

unit increase in the household income will lead to a decrease in the demand for captured fresh water fish during the dry season, a unit decrease in the household income lead to a little increase in the demand for captured fresh water fish in the rainy season.

The household size were significant during the rainy season but not significant ($p > 0.05$) during the dry season and the entire sample coefficient of 0.01, -0.03 and -0.05 in dry season, rainy season and the entire sample respectively. These imply that a unit increase in the household size lead to a decrease in the demand for captured fish during the dry season, which will also leads to an increase in the demand for captured fresh water fish in the rainy season and also a unit decrease in the household size lead to a decrease in the demand for captured fresh water fish. The larger the size of each family in the rural household, the more they demand for captured fish for survival.

The ratio of children in the household were significant ($p < 0.05$) in both rainy season and the entire sample but not significant during the dry season with coefficient of -0.14, -0.35 and 0.25 in the dry season, rainy season and the entire sample respectively. All these imply that a unit decrease in the ratio of children in the household lead to a decrease in the demand for captured fresh water fish consumption during the dry season, the demand increases during the rainy season and the entire sample.

Water body was significant ($p<0.05$) in both rainy season and the entire sample, not significant ($p>0.01$) in the dry season with coefficients of 0.04, -0.08 and -0.01 in the dry season, rainy season and the entire sample respectively. This suggests that there were less demand for captured fresh fish during the dry season in the water body environment, while there were more demand for captured fresh water fish during the rainy season in the non-water body environment than in the water body environment. This is in line with Verbeke and Vackier (2005) whose study states that regional differences in fish consumption have been identified with people residing in water body areas eating more fish.

Table 5: Estimate of Probit regression for factors affecting rural household's demand for captured fresh water fish species

Independent variables	Dependent Variables					
	Expenditure Share of Captured Fish Species					
	Dry season coefficient (SE)	z-value	Rainy season coefficient (SE)	z-value	Entire sample coefficient (SE)	z-value
CONST	0.25 (0.20)	1.23	0.03 (0.16)	0.15	0.11 (0.14)	0.84
LNPCAPF	0.68*** (0.06)	10.73	0.05 (0.06)	0.79	-0.05 (0.05)	-1.00
LNPCHHI	0.08 (0.05)	1.62	-0.06 (0.04)	-1.57	-0.00 (0.03)	-0.13
LNSQPCHHI	0.03 (0.05)	0.64	-0.07* (0.04)	-1.83	-0.03 (0.01)	-1.04
HHSIZE	0.01 (0.01)	1.03	-0.03** (0.01)	-2.57	-0.01 (0.01)	-0.62
CHDR	-0.12 (0.10)	-1.36	-0.36*** (0.08)	-4.14	0.26 (0.08)	-3.77
TIMEQTR	-0.02** (0.01)	-2.36	-0.01 (0.01)	-0.66	-0.01 (0.01)	-0.49
WB	0.02 (0.05)	0.98	-0.09** (0.04)	-2.12	-0.02 (0.03)	-0.49
HHHEDU	-0.01 (0.01)	-0.06	0.02** (0.01)	2.07	0.01 (0.01)	1.71
HHHAGE	-0.00 (0.00)	-0.58	0.01*** (0.00)	3.78	0.00 (0.00)	1.82
HHHOCUP	-0.04 (0.05)	-0.91	0.08** (0.04)	2.11	0.02 (0.03)	0.93
IMR	0.02 (0.11)	0.16	-0.18** (0.07)		-0.12 (0.06)	-1.77

Source: Data Analysis, (2017).

SE = Standard error. *** = 1% significant level; ** = 5% significant level; and * = 10% significant level.

The households' head education were significant ($p<0.05$) during the rainy season but not significant during the dry season and the entire sample with coefficients of -0.01, 0.02 and 0.01 in dry season, rainy season and the entire sample respectively. It was observed that the better the educational background of the respondents the more they demand for captured fresh water fish.

Household age and occupation were significant during the rainy season but not significant ($p > 0.05$) during the dry season with positive coefficients of 0.01 and 0.08 on age and occupation during the rainy season respectively suggesting that the older the age and occupation of the households' head the more they demand for captured fresh water fish in both dry season and rainy season. This agrees with (Olsen, 2008) that older people reports a higher level of health involvement and this may explain their levels of fish consumption. .

CONCLUSIONS AND RECOMMENDATION

- The demands for fish were affected by the production environment and closeness to water bodies.
- Price, education, children, age, income and household size positively influenced demand for fish species in both rainy and dry seasons. Availability, variety, taste and texture have been found to be key determinants of fish demand.
- A unit increase in the capital household income expenditure leads to an increase in the fish consumption demand.
- Household income and its square term are not significant, meaning that a unit increase in the household income expenditure does not affect the fish consumption demand for marine fish.
- Oyo State no doubt has the potential for large scale production of fish through the water bodies to meet the fish demand of the state if all the potentials available are fully utilized to maximum level through modern technology.
- Government should create more enabling environment for more people to invest in aquaculture and make fish more affordable. This will improve sale to the households and improve fisheries on a higher sustainable level thus the protein intake of the households would increase.

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