

HOUSEHOLDS' WILLINGNESS TO PAY FOR FISH AS AN ANIMAL PROTEIN IN ILORIN WEST, KWARA STATE

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Abstract

Inadequate animal protein intake is a significant nutrition problem in Nigeria, which continues to pose a threat to the nutrition, health, and productivity of households. This study focused on the willingness to pay attitude of fish consumers' households regarding fish as animal protein in Ilorin West Local Government Area, Kwara State, in the face of increasing food prices and economic problems. The study was based on the theory of consumer behaviour, which explains the way households spend their limited income amongst competing needs. The study was designed cross-sectionally, and primary data were collected from 400 households through a structured questionnaire based on the Contingent Valuation Method. The data were analysed using descriptive statistics and the Probit regression model. The results indicated that the amount of the first bid, age, income, household size, location, and religion had a significant effect on willingness to pay for fish, while gender and marital status did not have a significant effect. The willingness to pay decreased with higher bid prices, while higher income, household size, and urban residence increased willingness to pay. The willingness decreased with age, and Muslim households had a higher willingness than Christian households. The study findings suggest that affordability and socioeconomic factors play an important role in determining willingness to pay for fish. It suggests policies that can stabilise fish prices sustainably.

Keywords: Contingent Valuation Method, Fish, Probit regression, Protein deficiency, Willingness to pay.

Jel. Code: D12, I15, Q13, Q18

1.0 INTRODUCTION

Protein is an indispensable macronutrient that plays a crucial role in body tissue growth and repair, in addition to supporting various physiological functions, including enzyme production, hormone regulation, and immune function (Food and Agriculture Organisation [FAO], 2021; Campbell et al., 2019). Although protein is a critical component of nutrition, protein deficiency is one of the most pervasive nutrition problems in developing countries, especially in Sub-Saharan Africa. In the entire world, more than 3 billion people are unable to afford a protein-rich, healthy diet and thus are at risk of malnutrition and negative health outcomes (FAO et al., 2023; World Bank,

2020). Protein deficiency is a major cause of stunted growth, impaired immune system function, reduced cognitive function, and disease susceptibility, particularly in children and pregnant women. This is the stylised fact that there is a strong correlation between inadequate intake of animal protein and poverty, rising food prices, low purchasing power, and limited dietary diversity.

Nigeria is not spared from this global protein malnutrition situation, where protein deficiency remains a major public health and food security concern. Available data suggest that the average per capita consumption of animal protein in Nigeria is still below the recommended daily intake of approximately 35 grams per person by the FAO (2021) and Obayelu et al. (2018). As a result, most families consume large quantities of carbohydrates and use poor-quality plant foods for protein, which are low in essential amino acids (EAA) for a balanced diet (Bouis & Saltzman, 2017). In addition, rising food prices, shrinking real household incomes, and inflationary pressures further diminish low- and middle-income households' capacity to access animal protein sources, thereby further exacerbating their nutritional vulnerability (World Bank, 2020). Malnutrition and protein-energy deficiency are serious problems in both urban and rural areas, due to inadequate animal protein consumption.

Fish holds a special place in the diet of households among the major animal protein sources owing to its relatively low cost, abundance, and nutritional content. Fish contains high-quality protein, essential fatty acids, vitamins, and minerals that are vital for healthy growth and development, including omega-3 fatty acids, iodine, zinc, iron, and vitamin D (FAO, 2021; Belton & Thilsted, 2014). Furthermore, fish is eaten by all and sundry irrespective of cultural and socio-economic groups in Nigeria and is believed to be more affordable than beef and poultry products. The fisheries sector is also a crucial source of food security, livelihoods, and employment. Although fish is an important food source, access is limited due to increasing fish transport costs, fish losses post-harvest, lack of adequate storage facilities, reliance on imported fish, and increasing fish market prices (Liverpool-Tasie et al., 2021). These problems reduce households' purchasing power for fish in sufficient quantities to meet their nutritional demands in urban centres like Ilorin West Local Government Area, where rapid population growth and income inequality exist.

Several empirical studies have examined household food consumption patterns, nutrition, and food demand in Nigeria. For instance, Obayelu et al. (2018) investigated household food expenditure and animal protein consumption, while Adeyonu et al. (2021) analysed the demand for animal

protein among rural households in Nigeria. More recently, Aborisade et al. (2024) estimated household meat demand using consumption and expenditure data, providing evidence on the determinants of meat consumption in Nigeria. Although these studies have made significant contributions to understanding household food demand and consumption behaviour, they have largely focused on aggregate food expenditure, meat demand, or general animal protein consumption. Consequently, they provide limited evidence on households' willingness to pay for beef as a specific source of animal protein. This study is aimed at filling the gap in empirical work that lacks willingness-to-pay for fish as a source of animal protein for households in Ilorin West Local Government Area of Kwara State, Nigeria. What is the willingness to pay for fish among households, and what socioeconomic factors affect willingness to pay given increased nutritional demand and rising fish prices?

This study seeks to address the main research question: What is the willingness to pay of households for fish as a source of animal protein in Ilorin metropolis?

The general aim of this study is to analyse the households willing to pay for fish as a source of animal protein in Ilorin West Local Government of Kwara State, while the specific aim of the study was to examine the socio-demographic characteristics of the households in the study area and to determine the socio-economic factors influencing the willing to pay for fish as a source of animal protein in the study area.

As far as the significance of the study is concerned, the results will add to the existing literature on food demand and will give policy-relevant information to enhance access to affordable animal protein in Nigeria.

This research consists of five sections. Section one is a general introduction to this research. The literature review is presented in Section Two. It begins with a discussion of the theoretical review and then moves on to the empirical review for animal protein and willingness to pay. The third section addresses the research method, which includes the theoretical framework, model specification, data collection, and data instruments. The empirical results are presented and discussed in section four, with the last part of the study presenting the summary, conclusion, and recommendations.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Protein Deficiency

Protein deficiency is a lack of protein in the diet that is needed for normal growth, repair, and immunity. Nutrition problems are still a big issue in Nigeria because of poverty, increasing food costs, and lack of access to good-quality animal protein. A chronic protein deficiency leads to malnutrition and adverse health effects (FAO, 2021; FAO et al., 2023).

2.1.2 Fish as a Source of Animal Protein

Fish is a source of high-quality animal protein, rich in essential amino acids, vitamins, minerals important for healthy growth and development, and omega-3 fatty acids. Fish consumption is high in Nigeria due to its relatively low price and availability. But the increasing cost of living and economic concerns have cut down the capacity of households to afford a sufficient amount (Belton & Thilsted, 2014; Liverpool-Tasie et al., 2021; Food and Agriculture Organization of the United Nations [FAO], 2023).

2.1.3 Household Willingness to Pay

The willingness to pay (WTP) is defined as the maximum amount a household is willing to pay for a commodity or service given its preferences, income, and benefits. In this study, WTP reflects the value of fish as an animal protein source and households' purchasing behaviour, driven by the economic conditions prevailing at the time of WTP (Hanemann, 1984; Mitchell & Carson, 1989; Haab & McConnell, 2002).

2.1.4 Contingent Valuation Method

The Contingent Valuation Method (CVM) is a stated preference method of estimating willingness to pay for goods or services in a hypothetical market. The single-bounded dichotomous choice approach was used, in which the respondents accepted or rejected a fixed price offered, and the answers were analysed with a Probit regression model (Hanemann, 1984; Greene, 2018).

2.2 Theoretical Review

2.2.1 Theory of Consumer Behaviour

The theory of consumer behaviour was developed during the neoclassical economics revolution of the late nineteenth century by economists such as William Stanley Jevons, Carl Menger, and

Alfred Marshall, who explained how consumers allocate limited income among competing goods to maximise satisfaction (Jevons, 1871; Menger, 1871; Marshall, 1890). The theory assumes that consumers are rational decision-makers who seek to maximise utility subject to a budget constraint. It further assumes that preferences are complete, transitive, and stable, that prices and income are known, and that goods are divisible, enabling consumers to make consistent consumption choices (Varian, 2014; Nicholson & Snyder, 2017). Empirical applications of traditional consumer theory have been hindered by researchers' focus on its assumptions. This theory assumes that products are merely products, implying that consumers derive utility directly from them. The theory proved to be insufficient in the second half of the 20th century. Strotz (1957) suggested the utility tree, an attempt to make the utility more amenable to empirical study. Strotz claimed that the utility, U , for the consumption of the specific product is the sum of branch utility functions of the components involved in the consumption of the specific product. Strotz (1957) suggested that the utility tree is similar to the budgeting process. This process begins by allocating a budget to different categories of expenditures, such as food, which can be further divided into specific categories like chicken and fish. Subsequently, the budget is distributed among individual commodities within each of these categories. The utility of the Strotz utility tree can be written as:

$$U_t = u(ct) + \beta \delta u(c_{t+1}) + \beta \delta^2 u(c_{t+2}) + \dots + \beta \delta^{T-t} u(T) \dots \dots \dots 2.1$$

The branch utility function is where U is the consumer's utility, and $u(c_t) + \beta \delta u(c_{t+1})$ is the consumer's derivative. The n th component $c_1, \dots, c_N$ of the consumer utility function is divided into M separate branch functions, with the sum of these $\alpha + \beta + \dots + \mu = N$, where N is the number of commodities in the consumer's utility function.

Improving on Strotz's (1957) utility tree, Muth (1966) came up with a weakly separable utility function. Muth (1966) illustrated that a consumer utility function, $U = U(X_1, \dots, X_P)$, comprises products, X_i , such as nourishment. He added that the consumer has P production functions, $X_p = (q_{p1}, \dots)$, where q_i are the products that she consumes, such as raw chicken, from which the products consumed by the consumer are derived.

2.3 Empirical Review

Bett et al. (2013) applied the Contingent Valuation Method (CVM) and Probit regression model to examine consumers' willingness to pay for safe beef in Kenya. The findings revealed that household income, education, food safety awareness, and consumers' confidence in meat quality significantly increased willingness to pay a premium for safe beef. The study contributed substantially to understanding consumer valuation of beef quality attributes. However, its focus was on food safety and premium beef rather than beef as an essential source of dietary protein. Moreover, the study was conducted in Kenya, limiting its applicability to the Nigerian context where affordability and protein deficiency remain major concerns. The present study differs by examining households' willingness to pay for beef primarily as a source of animal protein within the Nigerian socioeconomic environment.

The study by Olagunju et al. (2020) used descriptive statistics and regression analysis to examine the determinants of fish consumption of urban households in Ibadan, Nigeria. The findings indicated that the consumption pattern of fish was significantly affected by income, household size, and fish prices. The research also highlighted that fish is one of the most readily available animal protein sources for low-income families. However, the study was more concerned with consumption behaviour than willingness to pay, although this was relevant. In addition, it was not able to quantify the willingness to pay by households for fish, nor to consider the role of price in the occurrence of protein deficiency. This present study tries to fill this void by explicitly quantifying willingness to pay for fish and analysing the socioeconomic variables that affect willingness to pay.

Adepoju et al. (2020) employed descriptive statistics, including frequency distributions, percentages, and mean analysis, to examine fish consumption and nutrition security among rural households in Southwestern Nigeria. The findings showed that fish was a major source of dietary protein and was widely consumed because of its relatively lower cost compared with other animal protein sources. The authors also reported that low-income households relied heavily on fish to meet their protein requirements. However, the study was limited to descriptive analysis and did not estimate households' willingness to pay for fish or examine the socioeconomic factors influencing such decisions. Consequently, it provided limited empirical evidence on the value

households attach to fish as an animal protein source. To address this limitation, the present study applies the Contingent Valuation Method (CVM) and a Probit regression model to estimate households' willingness to pay for fish and identify its socioeconomic determinants in Ilorin West Local Government Area, Kwara State.

Babatunde and Olorunsanya (2021) used multiple regression analysis to examine the determinants of fish demand of fish households in Kwara State. The results revealed that the factors of income, education, and household size positively affected fish demand, while prices negatively influenced fish consumption. Considering the relatively lower price of fish than beef and poultry, the study highlighted its role in enhancing the nutritional status of households. The study did not, however, concentrate on the estimation of willingness to pay but rather on demand analysis. Furthermore, it failed to explicitly analyse the contribution of fish to alleviating protein deficiency among households based on its affordability. This is different from the current study, which uses the willingness to pay analysis to assess the value households place on fish as a protein source from animals.

The choice experiment approach was used to study consumer preferences for smoked fish products in Ogun State, Nigeria, by Akinyele and Shittu (2022). The research revealed that the influence of freshness, package, and taste significantly influenced consumers' decisions to buy fish, and higher income household was found to be more interested in the premium fish product. The study gives very useful information about fish product preferences, but it was oriented mainly towards value-added fish products, and little towards fish consumption as a nutritional requirement. Furthermore, the study did not explore the relationship between willingness to pay and the capacity of the households to consume the recommended amount of protein. The present study is different because it investigates fish as a basic food to meet animal protein requirements and the willingness to pay in relation to protein deficiency and affordability.

Eze et al. (2023) employed descriptive statistics and multiple regression analysis to examine the effect of rising food prices on fish consumption among low-income households in Southeast Nigeria using household survey data. The findings revealed that fish consumption declined significantly due to inflation, particularly among larger households with lower purchasing power. The authors concluded that increasing food prices threaten nutrition security and worsen protein

deficiency among vulnerable households. However, the study focused on consumption responses to inflation without explicitly estimating households' willingness to pay for fish. Consequently, it provided limited evidence on the value households attach to fish as an animal protein source. The present study addresses this gap by applying the Contingent Valuation Method (CVM) and a Probit regression model to estimate households' willingness to pay for fish and identify its socioeconomic determinants in Ilorin West Local Government Area, Kwara State.

The Food and Agriculture Organisation (FAO, 2023) stated that fish is a significant source of food and nutritional security, especially in developing countries, where fish is a key source of cheap animal protein. The report noted that continued high food prices, poverty, and supply chain difficulties continue to constrain food systems from providing households access to nutritious diets, raising the likelihood of protein deficiency in Sub-Saharan Africa. The report offers solid macro-level evidence of the importance of fish as a source of combating malnutrition, but does not present empirical analysis of willingness to pay for fish at the household level. The present study seeks to mitigate this by giving micro-level evidence regarding willingness to pay for fish in Ilorin West Local Government Area, Kwara State.

Aborisade et al. (2024) employed the Exact Affine Stone Index (EASI) demand system to estimate meat demand in Nigeria using nationally representative household consumption and expenditure panel data. The study found that income, meat prices, and household expenditure significantly influenced demand for beef and other meat products. Beef was identified as a normal good with positive expenditure elasticity, while its demand declined as prices increased. Although the study provides robust evidence on meat demand behaviour in Nigeria, it focused on demand elasticities rather than households' willingness to pay. Furthermore, it did not estimate the socioeconomic determinants influencing households' acceptance of a proposed beef price using contingent valuation techniques. The present study addresses this gap by employing the Contingent Valuation Method (CVM) and Probit regression to estimate households' willingness to pay for beef and its

Using contingent valuation techniques, Okeke et al. (2024) explored consumers' willingness to pay for sustainably sourced fish in Nigeria. The study concluded that environmental awareness, income, and education levels were significant factors that affected the willingness to pay for sustainable fish products. The study shows evidence of the value placed by consumers on fish

products, but the study was mainly based on environmental sustainability and not nutritional welfare. Further, this study focused on high-value fish products consumed by the well-educated and well-informed consumers who are concerned about the environment, which restricts the scope of the study to the low-income consumers who are protein-deficient. The present study is unique in that it concentrates on the issue of the affordability of fish and the effect of fish on household protein intake.

Idisi et al. (2025) conducted a comprehensive review of meat demand studies among urban households in Nigeria using evidence from studies that employed LA/AIDS, QUAIDS, Tobit, multiple regression, Marshallian demand functions, and Rotterdam demand models. The review concluded that beef remains a necessity for many Nigerian households, while income and own-price effects consistently influence meat demand. The study also highlighted that beef demand is generally responsive to changes in household income and market prices. Nevertheless, the review synthesised existing demand studies without providing primary empirical evidence on households' willingness to pay for beef. In addition, it did not utilise contingent valuation techniques or investigate the socioeconomic factors influencing households' willingness to accept a proposed beef price. The current study fills this gap by estimating households' willingness to pay for beef using the Contingent Valuation Method and a Probit regression model.

From the empirical studies reviewed, it is clear that most of the past studies have concentrated on fish consumption patterns and consumer preferences for processed or value-added fish products and general food demand behaviour, while very little attention has been given to the willingness to pay for fish as a specific animal protein source by households. The majority of the studies reviewed also focused on the quality attributes of the product, sustainability issues, or the total household food budget, rather than a specific focus on fish consumption and the issue of protein deficiency in households.

3.0 METHODOLOGY

3.1 Theoretical Framework

The theoretical framework of this chapter is anchored on the theory of Consumer behaviour, which provides the basis for analysing households' willingness to pay (WTP) for chicken as a source of animal protein in Ilorin West Local Government, Kwara State, Nigeria.

The theory of consumer behaviour, based on the neoclassical economic paradigm, assumes that the consumer makes choices to optimise utility within the limits of his or her budget (Varian, 2010). Households evaluate various portfolios of goods and services, for example, animal protein in food, according to their preferences, income, and the price of goods. Consumer demand theory, therefore, serves as the basis for the analysis of consumer behaviour in the allocation of limited income among protein sources and the price of each of them in the context of the economic situation and income variability.

The theory is applied in this study to estimate the marginal effects of income, prices, and household characteristics on the WTP for fish. It also assumes that the choice of protein consumption depends on the price and preference for protein consumption under financial constraints, to capture trade-offs in protein choice behaviour.

Accordingly, the model for this study is specified as:

$$\begin{aligned} \log(\text{oddsPyR1}) \\ = a_0 + \Omega_1 \text{IBFISH}_{it} + \Omega_2 \text{INC}_{it} + \Omega_3 \text{HHS} + \Omega_4 \text{REL}_{it} + \Omega_5 \text{MS}_{it} + \Omega_6 \text{AGE}_{it} \\ + \Omega_7 \text{GEN}_{it} + \Omega_8 \text{GEN}_{it} + \varepsilon \dots \dots \dots 2.2 \end{aligned}$$

Where: R1 = probability of yes to pay per kg of fish, IBFISH_{it} = Initial Bid Price per kg of fish, INC_{it} = Income, HHS_{it} = Household Size, REL_{it} = Religion, AGE_{it} = Age, GEN_{it} = Gender. LOC_{it} = Location, MS_{it} = Marital Status, Ω_1 = parameter to be estimated, ε_i = error term.

Regarding the measurement of the variable, the dependent variable was households' willingness to pay (WTP) for beef, measured as a binary outcome, where respondents who accepted the initial bid were coded 1, and those who rejected it were coded 0. The initial bid (IBBEEF) was measured as the amount (₦/kg) offered to respondents in the contingent valuation scenario. Age was measured in completed years, income as respondents' current monthly income (₦), and household

size as the total number of persons living and feeding from the same household. Location was specified as a dummy variable, with urban = 1 and rural = 0 (reference category). Gender was coded male = 1 and female = 0 (reference category). Religion was represented by dummy variables, with Christianity serving as the reference category, while Islam = 1, otherwise 0, and Traditional religion = 1, otherwise 0. Employment status was also included as dummy variables, where private-sector employment = 1, otherwise 0, public-sector employment = 1, otherwise 0, with the omitted category representing respondents in other occupations. Awareness of beef as a source of animal protein (AOPS) was measured as a binary variable, coded 1 if the respondent was aware and 0 otherwise; SINGLE =single respondent, DIVORCED=Divorced, WIDOWED=widowed, where MARRIED is the reference category for the three marital statuses.

The study was conducted in Ilorin West Local Government Area of Kwara State, Nigeria, one of the three metropolitan local government areas in Ilorin. The area is characterised by rapid urbanisation, multiple socio-economic activities, and a mixed population of civil servants, traders, artisans, students, and private sector workers, and is ideal for studying the willingness of households to pay for fish as an animal protein source.

The study population was the households of Ilorin West Local Government Area. A multistage sampling was used, which comprised purposive selection of local government areas, random selection of wards, and then systematic selection of households in communities. The sample size was determined using the Yamane (1967) formula for finite populations at a 5% level of precision and a 95% confidence level. Based on the estimated number of households in Ilorin West Local Government Area, the formula yielded a sample size of approximately 400 households. Consequently, 400 households were selected using a multistage sampling procedure for the survey. The primary data were gathered using a structured questionnaire, which was designed according to the Contingent Valuation Method (CVM). This instrument was used to obtain information about the socioeconomic characteristics of the respondents, their fish consumption, their awareness of fish as a protein source, and their willingness to pay, with the single-bounded dichotomous choice approach. A questionnaire was created in English and translated into Yoruba for effective communication. This instrument was piloted first to validate it. Data were coded and analysed using SPSS and STATA software. Descriptive statistics were used to summarise characteristics of

the respondents, and the Probit regression model was used to determine the socioeconomic determinants of the willingness to pay for fish by the households.

4.0 Results and Discussion

This section presents and analyses the study's empirical results, starting with respondents' demographic characteristics before proceeding to probit regression results.

4.1 Descriptive Analysis

The descriptive statistics in Table 4.1 summarise the demographic characteristics and key variables used in this study. The total sample consisted of 400 households in Ilorin West Local Government.

Table 4.1. Results of Respondents' Demographic Characteristics

Variable	Category	Frequency (n=400)	Percentage (%)
Gender (GEN)	Male	171	42.74
	Female	229	57.25
Age (Age)	18-30	131	32.75
	31-40	99	24.75
	41--50	109	27.25
	51-60	44	11.00
	61 above	17	4.25
Employment Status (EMPL)	Unemployed	4	1.0
	Retired	8	2.0
	Student	53	13.25
	Self Employed	252	63.0
	Employed in the Private Sector	46	11.50
	Employed in the Public Sector	37	9.25
Monthly Household Income (INC)	Less than ₦30,000	22	5.50
	₦30,000 – ₦59,999	69	17.25

	₦60,000 – ₦89,999	74	18.50
	₦90,000 – ₦119,999	72	18.0
	₦120,000 and above	90	22.50
	₦250,000 and above	73	18.25
Marital Status (MS)	Single	130	32.50
	Married	252	63.0
	Divorced	6	1.50
	Widowed	12	3.0
Religion (REL)	Others	2	0.50
	Traditional	4	1.0
	Islam	254	63.5
	Christianity	140	35.0
Location (LOC)	Rural	68	17.0
	Urban	332	83.0
Household Size (HHS)	1-3	88	22.0
	4-6	228	57.0
	7-10	68	17.0
	10 Above	16	4.0
Awareness of Fish as an important source of protein (AOFPS)	No	5	1.25
	Yes	395	98.75

Source: Authors' computation from data analysis, 2026

4.2 Test Results

Some preliminary diagnostic tests were performed before the estimation of the Probit regression model to verify the suitability and reliability of the data for the analysis. The Probit regression model was adopted because the dependent variable, households' willingness to pay for beef, is binary, taking a value of 1 if a respondent accepted the offered bid and 0 otherwise. The Probit model assumes that the latent error term follows a standard normal distribution, making it appropriate for estimating the probability of discrete choice outcomes while ensuring predicted

probabilities remain between zero and one (Greene, 2018; Wooldridge, 2019).

Table 4.2 Probit Regression Results

Variable	Coefficient	Z-Scores	P-Value
IBFISH	-0.0019012	-3.85	0.000
AGE	-0.0141132	-1.81	0.070
INC	9.63e-07	2.07	0.038
HHS	0.0771119	2.42	0.015
LOC	0.3864471	2.08	0.038
GEN	0.138436	0.99	0.320
RELIGION (Ref: Christianity)			
REL_TRAD	0.3884113	0.54	0.591
REL_ISLAM	0.2881524	2.04	0.042
MARITAL STATUS (Ref: Married)			
SINGLE	0.1636428	0.80	0.425
DIVORCED	0.138307	0.25	0.801
WIDOWED	-0.6047277	-1.40	0.161
CONS	6.516099	3.54	0.000
Log likelihood	-246.02427		
Prob > chi2	0.0000		
Pseudo R2	0.0840		
LR chi2(9)	45.09		

Note * $p < 0.05, 0.10$; the reference categories are Christianity, Married

Explanatory Note: RIIBFISH = dependent variable (yes or no responses), IBFISH = initial bid amount for Fish presented to the respondents, GEN = gender, where female is reference category, EXAGE = Exact age of the respondents, INC = current actual income of respondents, EXHHS = Exact Household size, LOC = Location, where Rural is reference category, SINGLE = single respondent, DIVORCED = Divorced, WIDOWED = widowed where MARRIED is the reference category for the three marital status, REL_ISLAM = Respondents who are Muslim, REL_TRAD = Traditional, while Christianity is the reference category, and cons = constant.

Although both Probit and Logit models are suitable for binary response data and often produce similar results, the Probit model is particularly preferred in contingent valuation studies because it is consistent with the random utility framework underlying willingness-to-pay analysis and has

been widely applied in valuation studies involving dichotomous choice responses (Hanemann, 1984; Haab & McConnell, 2002). Therefore, the Probit model was considered the most appropriate technique for estimating the socioeconomic determinants of households' willingness to pay for beef in the study area. Descriptive statistics were used initially to analyse the distribution and properties of the variables. Subsequently, the multicollinearity among the explanatory variables was examined, and the Variance Inflation Factor (VIF) and correlation matrix showed that there was no serious multicollinearity problem, as all variables were within acceptable limits.

The Probit regression model was used to investigate the determinants that affect the willingness to pay for fish as a source of animal protein in Ilorin West Local Government Area, Kwara State. The model in Table 4.2 was statistically significant ($LR \chi^2 = 45.09$; $p < 0.000$), and thus, the explanatory variables explained the willingness to pay of the households collectively. The pseudo- R^2 value of 0.0840 is reasonably good for a binary response model.

As seen in Table 4.2, initial bid amount (IBFISH) had a negative and very significant impact ($p < 0.001$), meaning that higher prices for fish significantly affected households' willingness to pay. Willingness to pay was positively associated with income ($p = 0.038$), suggesting that the more the household earned, the more the willingness to pay for fish under the given economic problems. Household size also had a positive and significant effect ($p = 0.015$), implying that larger households had greater nutritional needs for fish and thus valued it more. Willingness to pay was also significantly affected by location ($p = 0.038$), with urban households more likely to pay for fish, likely as a result of improved market access and income opportunities. Religion also played a role ($p = 0.042$), with Muslim households being willing to pay more than Christian households. In general, the results highlight that households' willingness to pay for fish depends on affordability, nutritional requirements, market accessibility, and selected socio-economic factors.

5.0 Discussion of Findings, Conclusions, and Recommendations

This study aimed to determine the factors influencing willingness to pay for fish, as a source of animal protein in households in Ilorin West Local Government Area, Kwara State, Nigeria, and adopted the Contingent Valuation Method (CVM) and Probit regression model. The results

indicated that the initial bid amount, income, household size, location, and religion were significant factors that affect willingness to pay, in that order, while age had a marginally significant effect. On the other hand, there was no significant difference between households' willingness to pay according to gender and marital status. The bid amount negatively influences households' willingness to pay for fish, indicating that inflation and reduced purchasing power affect their decisions. The willingness to pay was positively related to income and household size, indicating that richer and larger households value fish consumption more. Rural households and Christian households were found to be less willing to pay than their urban counterparts and Muslim counterparts, respectively. The study finds that fish is an important source of good animal protein, but due to its price and economic conditions, households cannot afford to eat sufficient amounts to meet their protein requirements and reduce protein deficiency. Factors associated with willingness to pay include household income, fish prices, accessibility to the markets, size of the household, and religion.

The study suggests policies focusing on the stabilisation of fish prices by supporting aquaculture production, low-cost credit, and lower transportation costs. The government also needs to enhance job creation and entrepreneurship, and poverty reduction programmes to boost household purchasing power. Investment is needed in market infrastructure, fish storage facilities, rural roads, cold chain, etc., to enhance the availability of fish. Furthermore, nutrition education and public awareness campaigns should be conducted in health centres, schools, religious institutions, and community associations, with greater efforts made to promote the consumption of fish. Lastly, macroeconomic policy measures need to be reinforced to make them more effective in assuring food price stability and agricultural sustainable productivity, contributing to enhancing household food security and reducing protein deficiency. The study provides empirical evidence on the socioeconomic drivers of willingness to pay for fish but has the limitation of being a cross-sectional study, making it unsuitable for analysing changes over time. Further research should be longitudinal and extended to other parts of Nigeria for greater policy relevance.

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