Determinants of Protein Consumption Among Farming Households in Otukpo Local Government Area of Benue State, Nigeria.

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ABSTRACT

The study examined the determinants of protein consumption among farming households in Otukpo Local Government Area of Benue State, Nigeria. A total of 100 respondents were selected. Primary data were collected with the use of structured questionnaire. Both descriptive and inferential statistics were employed for the study. The results of the socio-economic characteristics of respondent farming households revealed that most of the respondents were within the age range of 40 to 49 years, with the mean age of 44 years. Majority of the respondents were Christians, females and married, had a mean household size of 5 persons, no formal education, and had a mean monthly income of ₦200000. The results of the availability and consumption of protein food items among farming households in the study area revealed that majority of the respondents sourced their protein food items, which was fairly available from the market, spent between ₦2000 and ₦4000 on protein food items monthly, consumed one protein meal per day, indicated that protein foods were fairly affordable, consumed both animal and plant proteins, and believed that adults should consume more protein in the area. The results of the multiple regression analysis of the determinants of protein consumption showed that Monthly Income, Educational Level, Household Size and protein affordability were the significant factors that influenced household expenditure on protein consumption (₦) per month in the study area. The results of the constraints to protein consumption in the study area revealed that unavailability/insufficiency of protein – rich foods, which might be due to the distance to the source, and high cost of raising protein rich – crops/animals were the major problems that affected protein consumption in the study area. The study therefore recommends that respondents should diversify their means of generating income to increase their income, engage in planting legumes and rearing of livestock to increase their production of protein food source, there should be increase their formal education which should improve the protein intake, Government should put in place a pricing policy to bring down prices of protein food for affordability, and family planning progamme should be emphasized to the households in order to reduce the large household size prevalent in the study area.

Keywords: Determinants, protein, consumption, houdehilds.

INTRODUCTION

Globally, protein deficiency poses not only a major health problem but also an economic and social burden. It is regarded as perhaps the most important risk factor for illness and death, with millions of individuals affected (Obinna, 2021). Protein deficiency is a major cause of malnutrition. Malnutrition is linked across the life cycle, with under nutrition in foetal and early life contributing to both immediate and long-term health problems such as stunted physical growth, heart disease, diabetes and obesity. Malnutrition exists in multiple

forms. Maternal and child undernutrition contributes to 45 percent of deaths in children under five. Overweight and obesity are on the rise in almost all countries, contributing to 4 million deaths globally. The various forms of malnutrition are intertwined throughout the life cycle, with maternal undernutrition, low birthweight and child stunting giving rise to increased risk of overweight later in life. In 2018, 807 million undernourished people and 154 million stunted children under the age of five lived in low- and middle-income countries: of these, respectively, around 381 million and 73 million lived in high commodity-dependent countries (FAO *et al*., 2019).

From the above, it is obvious that, globally, malnutrition in all its forms remains a challenge. Although in 2020, it was not yet possible to fully account for the impact of the COVID-19 pandemic due to data limitations, it was estimated that 22.0 percent (149.2 million) of children under 5 years of age were affected by stunting, 6.7 percent (45.4 million) were suffering from wasting and 5.7 percent (38.9 million) were affected by overweight. The actual figures, particularly for stunting and wasting, are expected to be higher due to the effects of the COVID-19 pandemic. Most children under five years with malnutrition live in Africa and Asia. These regions account for more than nine out of ten of all children with stunting, more than nine out of ten children with wasting and more than seven out of ten children who are overweight worldwide (FAO *et al*., 2021).

Protein is an important part of a basic diet (Gakpo, 2020). It is widely regarded as an essential building block of life. It is found in every cell of the body. When people do not get adequate amounts of food from their diet, it leads to protein deficiency, which is today a major cause of malnutrition. The World Health Organization describes malnutrition as "the gravest single threat to the world's public health". Protein is a macronutrient that is basic for the development, upkeep and repair of all your body's cells (Ibirogba, 2019). However, an estimated one billion people worldwide suffer from protein deficiency. The problem is most severe in Central Africa and South Asia, where about 30 percent of children consume too little protein. Protein deficiency causes various diseases, including kwashiorkor, which causes delayed growth and bloated bellies in children; edema, which causes swollen and puffy skin; fatty liver, which could result in liver failure; and skin, hair, nail and muscle problems. Lack of protein also causes poor wound healing, increased severity of infections, a weakened immune system, greater risk of bone fracture and stunted growth, which affects more than 160 million children annually. If left untreated, some of these conditions could lead to death (Gakpo 2020).

METHODOLOGY

Study Area

The study area is Otukpo Local Government Area (LGA), Benue State, North-central geopolitical zone of Nigeria. Otukpo is located in the middle belt region of zone C on the latitude 06^0 40'N and longitude 07^0 36'E. The LGA was created in the year 1976, and is bordered by the Apa, Ohimini, Ado, and Olamaboro LGAs. Otukpo town is the traditional headquarters of Idoma land, strategically located at the intersection of the Eastern railway line; the only road linking the Northern parts of the country to the Eastern parts. At present, the LGA is made up of four districts, namely: Otukpo, Akpa, Ugboju and Adoka. It has an average temperature of 29 degrees centigrade and is mostly characterized by grassy and flat topography. It experiences a typical tropical climate with two distinct seasons, the wet or rainy season and the dry season, annual rainfall of 150mm and an average temperature which ranges between 210C to 350C (BNARDA, 2005).

The LGA has numerous local dialects spoken in the diverse reaches of Idoma land. However, Idoma language is the umbrella lingua. The major dialects are Idoma, Igede, Agatu and Akpa. There are also other non indigenous dialects like Hausa, Igbo, Yoruba. The major occupation of the people is farming. Major crops grown are yam, cassava, sweet potato, rice, sorghum, maize, millet, benniseed and soya bean.

Otukpo LGA is intentionally chosen due to the fact that the production of leguminous crops and livestock is predominant in the area, but with few people consuming protein at the recommended rate.

Population

The study population comprised all the farming households in Otukpo LGA of Benue State.

Sample and Sampling Technique

Multi-stage sampling technique was used to select the farming household respondents in the study area. First, four council wards were purposively selected based on their popularity in farming. In stage two, a preliminary survey was conducted across the four selected council wards to find the total number of leguminous and livestock farming and consuming households in the wards. In the final stage, 50 percent of the identified households who had knowledge of nutrition through extension services in each of the four council wards were purposively selected. This gave a total of 100 farming households selected for the survey (Table 1), with the household heads as their respondents.

Table 1: Sample Size Selection Plan

	Council ward	**No. Of farming households with nutrition knowledge**	**Selected Sample Size (50%)**
1	Akpa	48	(50/100*49) =24
2	Otupkpo	52	(50/100*53) =26
3	Adoka	49	(50/100*48) =24
4	Ogboju	53	(50/100*52) =26
	Total	**202**	**100**

Source: Field preliminary Survey (2022).

METHOD OF DATA COLLECTION

Primary data were used for the study. These were collected using a well-structured questionnaire. The questionnaire comprised four sections, A to D. Section A deals with socio-economic characteristics of respondents in Otukpo LGA; section B deals with the availability and pattern of protein consumption of farming households; section C delves into the determinants of protein consumption; and section D identifies the constraints to protein consumption in the study area.

Model Specification:

Multiple Linear Regression Model

The OLS method was used to analyze objective 3 i.e. to determine the effect of certain determinants on the total cost of protein consumed by farming households in the study area.

The implicit model of the regression is specified as follows:

$$Y = \beta_0 + \beta_i X_i + U$$

Y = Dependent variable

β_0 = Slope/intercept

β_i = Coefficient of X_i

U = Error term

$$Y = f (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, U)$$

Explicitly, It is given as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + U$$

where,

Y = Total household expenditure on protein consumption (₦) per month

X_1 = Age (Years)

X_2 = Sex (Female = 1, 0 otherwise)

X_3 = Primary occupation (Civil Servant = 1, 0 otherwise)

X_4 = Monthly Income (Naira)

X_5 = Religion (Christianity =1, 0 otherwise)

X_6 = Marital status (Married = 1, 0 otherwise)

X_7 = Educational level (Formal education = 1, 0 otherwise)

X_8 = Household size (Number)

X_9 = Monthly expenditure on food items (₦)

X_{10} = Affordability of protein (Affordable = 1, 0 otherwise)

X_{11} = Awareness of the importance of protein (Yes = 1, 0 otherwise)

Logit Regression Model

In a dichotomous situation of Y, logit regression model was used to analyze the determinants of protein consumption in the study area. A binary response function (those that took protein more than other food source and those that did not take protein more than other food source) is specified and is estimated by the logistic procedure. The binary logistic specification is suited to model where the endogenous variable is dichotomous, which in this case are the households that took protein more than other food source and those who did not take protein more than other food source. The logistic regression then provides a model of observing the probability of a household taking more or less protein. The logistic model is specified explicitly as:

$Y=B_0 + B_1X_1 + B_2X_2 \dots\dots\dots\dots\dots\dots B_{11}X_{11}$

where,

Y= protein intake status (1, if they consumed protein than other food source; 0, if they did not consume protein than other food source)

X_1 = Age (Years)

X_2 = Sex (Female = 1, 0 otherwise)

X_3 = Primary occupation (Civil Servant = 1, 0 otherwise)

X_4 = Monthly Income (Naira)

X_5 = Religion (Christianity =1, 0 otherwise)

X_6 = Marital status (Married = 1, 0 otherwise)

X_7 = Educational level (Formal education = 1, 0 otherwise)

X_8 = Household size (Number)

X_9 = Monthly expenditure on food items (₦)

X_{10} = Affordability of protein (Affordable = 1, 0 otherwise)

X_{11} = Awareness of the importance of protein (Yes = 1, 0 otherwise)

Y is the dependent variable and *Xi* (i=1 to 11) are independent variables, *β* are the parameters to be estimated, and *U* is the error term.

Apriori Expectation: Some of the variables (education, monthly income, monthly expenditure on food items and occupation) are expected to positively influence protein consumption in the study area.

Techniques of Data Analysis:

Both descriptive and inferential statistics were employed in this study. The descriptive statistical tools such as frequencies and percentages were used to analyze objectives 1, 2 and 4. Inferential statistics such as OLS multiple regression and logit regression models were used to analyze objective 3 while OLS multiple regression was used to analyze the Hypotheses.

RESULTS AND DISCUSSION

Socio – Economic Characteristics of Farming Households in the Study Area

The results of the socio-economic characteristics of respondent farming households in the study area are presented in Table 2. The results revealed that most (33%) of the respondents were within the age range of 40 to 49 years. The mean age of the respondents was 44 years. This directly affects protein intake as people tend to reduce the quantity of protein consumed as they grow older e.g. consumption of meat and egg. The finding is in line with that of Adetunji and Adepoju (2011) who reported that most of the respondents were above 50

years in Orire Local Government Area of Oyo State, Nigeria. Majority (54%) of the respondent were females. However, males need more protein than females for body building (Amao, 2013). Majority (70%) of the respondents were married. This implies that the tendency to consume more protein in the area would be high since majority of the respondents were married. This finding is supported by Amao (2013) who found that protein consumption was dominated by the married in Ila Local Government Area of Osun State, Nigeria. The result on household size showed that majority (68%) of the respondents had 1 to 5 household members with a mean household size of 5 persons. This is in line with the findings of Olasunkanmi (2011) in Ogun State.

Majority (56%) of the respondents had no formal education. The result implies that educational level was low in the study area, consequently, the importance of protein intake might not be well appreciated. Also, majority (71%) of the respondents had monthly income range of ₦151000 to ₦200000 with a mean monthly income of ₦200000. This implies that majority of the household earned high per month. The high income might increase the level of protein intake despite its cost. The study results also revealed that majority [69 %) of the respondents were Christians. Respondents' religion may affect the level of protein taken as some religion restricts their faithful/worshipers from eaten some animals which are sources of protein e.g. all Islamic faithfuls are restricted from eating pork, etc. All these restrictions can affect the level of protein intake by the household. This finding corroborated that of Adetunji and Adepoju (2011) who found that majority of the respondents were Christians in Orire Local Government Area of Oyo State, Nigeria.

Table 2: Distribution of Respondent Farming Households according to their Socio-economic Characteristics in the Study Area (n = 100)

Variable	Frequency	Percentage (%)	Mean
Age (years)			
< 30	6	6	
30-39	30	30	44
40 – 49	33	33	
$\geq$ 50	31	31	
Sex			
Male	46	46	NA
Female	54	54	
Marital Status			
Single	30	30	NA
Married	70	70	
Educational Qualification			
Formal Education	44	44	

No Formal Education	56	56	NA
Household Size (number)			
1-5	68	68	5
6-10	32	32	
Monthly Income Level (₦)			
100000-150000	14	14	
151000-200000	71	71	200000
>200000	15	15	
Religion			
Christianity	69	69	NA
Islam	31	31	

Source: Field Survey, 2023   NA = Not Applicable

Availability and Consumption of Protein Food Items among Households in the Study Area

The results of the availability and consumption of protein food items among farming households in the study area are presented in Table 3. The results revealed that majority (51%) of the respondents claimed they sourced their protein food items from the market. Also, majority (60%) of the respondents claimed that protein was fairly available in the area. This result suggests that the percentage of protein food items produced in the study area was low and therefore needs to be increased or supplemented. Majority (85%) of the respondents spent ₦2000 and ₦4000 on protein food items monthly. Considering the income level of most households in the study area, it can be deduced that most of them spent less on protein foods and this might be due to the high cost of protein foods, their unavailability or other competing family needs. Thus in terms of number of protein meals consumed daily in the study area, majority (54%) of the respondents consumed one protein meal (in partial meals) per day. This implies that they usually combined protein meal with other type of meal (e.g. carbohydrate) once daily.

Majority (59%) of the respondents indicated that protein foods were fairly affordable. About 30 percent of the respondents depended solely on plant protein which has incomplete amino acids and economically cheap compared to animal protein (10%). Majority (60%) of the respondents however consumed both animal and plant proteins even though animal protein is more expensive. The level of protein consumption by household members shows that only 13 percent of the respondents agreed that babies needs more protein in their meal. About half of the respondents (50%) believed that adult should consume more protein. The result therefore implies that many households were not aware that babies should consume more protein than other members for growth and development. This result is in line with the finding of Adetunji and Adepoju (2011) who reported that about half of the respondents (50%) believed that adult should consume more protein in Orire Local Government Area of Oyo State, Nigeria.

Table 3: Distribution of Respondents according to Availability and Consumption of Protein Food Items among Households in the Study Area

Variable	Frequency	Percentage
Source of protein consumed		
Market	51	51
Farm	28	28
Gift	21	21
Protein availability in the area		
Available	35	35
Fairly available	60	60
Not available	5	5
Monthly expenditure on protein		
food items (₦)		
< 2000	1	1
2000 – 4000	85	85
>4000	14	14
Number of protein meals consumed		
daily (in partial meal)		
1	54	54
2	26	26
3	20	20
Affordability of protein foods		
Affordable	20	20
Fairly affordable	59	59
Not affordable	21	21
Type of protein often consumed		

Animal protein	10	10
Plant protein	30	30
Both protein sources	60	60
Household members that consume		
more protein		
Babies	13	13
Children	11	11
Adult	50	50
Old	26	26

Source: Field Survey, 2023

Determinants of protein consumption among the farming households in the study area

The results of the multiple linear regression analysis of the determinants of protein consumption in terms of total amount spent by households on protein consumption (₦) per month in the study area are presented in Table 4. The coefficient of multiple correlation (R) equals 0.4889 (49%). It means that there is a direct relationship between the explanatory variables and household expenditure on protein consumption (₦) per month in the study area. The R^2 is 0.2390. This suggests that 24 percent of the variability in the total household expenditure on protein consumption (₦) per month in the study area is jointly explained by variations in the specified independent variables considered in the model. The adjusted R^2 is 0.1439 (14%). The F-Value obtained (2.5123) indicates that the overall equation is statistically significant at 1 percent (p<0.01). The results showed that monthly income, educational level, household size and protein affordability were the significant factors that influenced household expenditure on protein consumption (₦) per month in the study area. These are in line with *a priori* expectation.

The coefficient of monthly income (22.272) was positive and statistically significant at 5 percent level. This implies that an increase in the monthly income of the farming households would increase the household expenditure on protein consumption (₦) per month in the study area by 2227.2 at the 0.05 level of significance. The coefficient of the educational level (0.8394) of the farming households was positive and statistically significant at 5 percent level. This implies that an increase in the educational level of the farming households would increase the household expenditure on protein consumption (₦) per month in the study area by 83.94 at the 0.05 level of significance. This finding agrees with Adetunji and Adepoju (2011) who found that an increase in the educational level of household members would bring about a an increase in the amount spent on protein consumption by the households in Orire Local Government Area of Oyo State, Nigeria.

The coefficient of household size (0.2417) was positive and statistically significant at 10 percent level. This implies that an increase in the household size would increase the household expenditure on protein consumption (₦) per month in the study area by 24.17 at the 0.1 level of significance. This finding disagrees with that of Adetunji and Adepoju (2011) who found that an increase in the number of household members would bring about a reduction in the amount spent on protein consumption by the households in Orire Local Government Area of Oyo State, Nigeria. The coefficient of protein affordability (0.9679) was positive and

statistically significant at 5 percent level. This implies that an increase in the farming household protein affordability would increase the household expenditure on protein consumption (₦) per month in the study area by 96.79 at the 0.05 level of significance. This is because the farming households would spend more on protein - rich food items in response to increase in their income level or a decrease in the food prices.

The F-Value obtained (2.5123) from the Multiple Linear Regression Analysis, which indicates that the overall equation is statistically significant at 1 percent (p<0.01) shows that the selected socio-economic characteristics of the farming households have significant effects on farming household protein consumption in the study area. The F – Value also shows that the selected determinant explanatory variables significantly affect farming household protein consumption in the study area. Hence, the null hypotheses are rejected.

Table 4: Multiple Linear Regression Analysis of the Determinants of Protein Consumption among Farming Households in the Study Area

Variables	Coefficients	Standard Error	t Statistic	P-value
Intercept	-4.3559	2.4232	-1.7975	0.0757*
Age	-0.0299	0.0252	-1.1854	0.2391
Sex	0.1357	0.3982	0.3408	0.7341
Occupation	-0.1830	0.3303	-0.5540	0.5810
Monthly Income	22.272	8.8313	2.5219	0.0135**
Religion	0.0337	0.4014	0.0839	0.9333
Marital Status	0.0583	0.5462	0.1068	0.9152
Educational Level	0.8394	0.4176	2.0010	0.0475**
Household Size	0.2417	0.1248	1.9369	0.0560*
Monthly Food Expenditure	0.0004	0.0003	1.2377	0.2191
Protein Affordability	0.9679	0.4627	2.0919	0.0393**
Awareness of Protein Importance	0.5499	0.3865	1.4228	0.1583

Significant at 5% and 10% (**P < 0.05, *P = 0.1)

Multiple R = 0.4889 R^2 = 0.2390   Adjusted R^2 = 0.1439   F = 2.5123

Source: Field Survey, 2023

Logit Regression Analysis for Determinants of Protein consumption Status of Households in the Study Area

The results of the logit regression analysis for the determinants of protein intake among farming households in the study are presented in Table 5. The analysis of the survey data revealed that one out of the eleven variables fitted in the model was significant in explaining the variation in the protein intake status of households in the study area. This variable was the educational qualification of the households. This variable was however found to be negative and significant at 5 percent level, against *a priori* expectation. This implies that an increase in education did not increase protein consumption than other food source. This might indicate that the education received by the households did not sufficiently emphasize the importance of protein in the body. It could also mean that the educated in the area lacked access to well – paid jobs which limited their protein intake. Keeping other factors constant, a unit increase in a year of schooling of the household head decreases the likelihood of the households' consuming protein by a factor of 0.2841 (71.6%).

Table 5: Logit Regression Estimates for Determinants of Protein consumption Status of Households in the Study Area

Variable	Coefficient	Standard Error	p-value	Odds Ratio
Constant	1.9807	3.2185	0.5383	0.0000
Age	-0.0101	0.0365	0.7817	0.9899
Sex	-0.1728	0.5689	0.7614	0.8413
Occupation	0.4394	0.6598	0.5055	1.5517
Monthly Income	0.0000	0.0000	0.9388	1.0000
Religion	0.0395	0.5716	0.9448	1.0403
Marital status	-1.0777	0.8097	0.1832	0.3404
Educational Qualification	-1.2583	0.6290	0.0454**	0.2841
Household Size	-0.0034	0.1742	0.9846	0.9966
Monthly Expenditure	0.0004	0.0004	0.3145	1.0004
Protein Affordability	0.1572	0.6777	0.8166	1.1702
Awareness of the importance of protein	-0.3406	0.5730	0.5523	0.7114

Source: Field Survey, 2023   **Significant at 5%

Constraints to Protein Consumption in the Study Area

The results of the constraints to protein consumption in the study area are presented in Table 6. The results

revealed that unavailability/insufficiency of protein – rich foods (87%), which might be due to the distance to the source, and high cost of raising protein rich – crops/animals (87%) which rank first, are the major problems affecting protein consumption in the study area.

Table 6: Distribution of Respondents by Constraints to Protein Consumption among Households in the Study Area

Problems	Frequency*	Percentage	Rank
Poverty	80	80	4th
Low Household Income/Purchasing Power	79	79	5th
Culture/superstition	69	69	6th
Religion	31	31	10th
Unavailability/insufficiency of protein – rich foods	87	87	1st
Food policy inconsistency	67	67	8th
Knowledge gap/poor education/poor nutritional knowledge	67	67	8th
Unemployment	69	69	6th
High cost of raising protein rich – crops/animals	87	87	1st
High cost of protein – rich sources	81	81	3rd
Age/Health Status	31	31	10th

Source: Field Survey, 2016   *Multiple Responses

CONCLUSION

Based on findings in the study, it was concluded that monthly income, educational level, household size and protein affordability, the significant determinants had positively influenced protein consumption in the study area. Also, majority of the respondents sourced their protein food items from the market, claimed protein was fairly available, spent between ₦2000 and ₦4000 on protein food items monthly, consumed one protein meal (in partial meals) per day, indicated that protein foods were fairly affordable, consumed both animal and plant proteins, and believed that adults should consume more protein in the area. Protein consumption is majorly constrained by unavailability/insufficiency of protein – rich foods, which might be due to the distance to the source, and high cost of raising protein rich – crops/animals in the study area.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:

1. Income had a direct effect on the pattern of protein consumption in the area. The respondents are therefore advised to diversify their means of generating income to increase their income.

2. Educational level also had a direct effect on the household expenditure on protein consumption in the area. There should be increased formal education of the respondents to increase the protein intake in the area. More educational programmes should also be organized so that the people will have more knowledge about the importance of protein in their diet and the age category that should consume more protein.

3. Increase in protein affordability brought about increased household expenditure on protein consumption in the area. Government should put in place a pricing policy in order to bring down prices of protein food to make it generally affordable in the study area.

4. The study area should be encouraged to engage in planting legumes and rearing of livestock to increase their production of protein food source, so that there will be enough for personal consumption and sale.

5. Increase in household size led to increased expenditure on protein consumption in the area. Family planning progamme should be emphasized to the households in order to reduce the large household size prevalent in the study area.

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