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Consumption of Animal Protein in Adamawa State: An Empirical Analysis

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Abstract. This study examined the consumption of animal protein in Adamawa State, specifically the consumption of meat, fish, milk and egg. The socio-economic characteristics, the income and expenditure distribution, the level of expenditure on major animal proteins as well as the variables influencing household consumption of major animal proteins were analyzed. One hundred and sixty – one households were randomly sampled from ten wards in the two Local Government Areas. Data were collected with structured questionnaires. The analytical tools include the arithmetic mean, percentages, income elasticity, marginal propensity to consume (MPC) and multiple Regression analysis. The results show that about 86% of the household heads were males, 94% were between 21 and 60 years, 81% were married. 78% were civil servants, 95% received education. Also, about 91% of the household had between 1 and 10 people in their domain, while income distribution indicated that about 86% of the household earned an average income of not more than ₦28, 000.00 per month. Fifty-two percent (52%) of the household expenditure was on carbohydrate, while 37% was spent on major animal protein products. The regression analysis indicated that education (at 5%), total household expenditure on food (at 1%), marital status of the household head (at 1%) and gender of the household head (at 1%) were the major determinants of household expenditure on the major animal protein products. The study recommends the reduction on income taxations, introduction of informal education and intensification of family planning education.

Keywords: animal protein, consumption, household expenditure, income elasticity, multiple regression.

1.0 Introduction

The Nigerian population and the overall demand for food is growing at an alarming rate while the current food production is growing at a decreasing rate much below the population growth rate and food demand. This has led to a heavy reliance on import of food items to supplement domestic production which the government is recently trying to fight against.

According to the recommendation of FAO (1997) the minimum nutrient requirement to be consumed per day are 2,191 kcal and 53.8 gram of crude protein, but food consumption in Nigeria fall short of these recommendations. The results of these inadequate food intakes are problems of under nutrition and malnutrition. In most cases, greater number of the people feed on staple food such as rice, maize, yam, garri, potatoes and so on which are relatively cheap neglecting the protein aspect of it.

Since malnutrition has always been a prevalent issue in the country, the situation made the government to adopt several measures to revive agriculture. Some of the measures adopted were the National Accelerated Food Production Programmes (NAFPP) in 1972, the Agricultural Development Prograrmmes (ADP's) in 1974, the Operation Feed the Nation (OFN) in 1976, the Green Revolution Programme (GRP) in 1979, the Operation Go Back to Land in 1984, The Directorate of Food, Roads and Rural Infrastructure (DFRRI) in 1986, The Structural Adjustment Programme (SAP) in 1986, the Family Support Programme (FSP) in 1994, the Rural Empowerment and Accelerated Programme (REAP) in 2001.There are others like the issues of getting fertilizers to the farmers, improve seed procurement among others.

By these measures the Government aimed at stimulating the Nigerian small scale farmers for increase in food production by supplying highly subsidized inputs and improved pricing policy and all that could make agriculture a successful venture. Despite all the government effort to eradicate food insecurity in the country, many families cannot make up to the recommended level of energy and protein requirements.This scenario now geared the researcher to attempt finding out the variables responsible for non-consumption or inadequate consumption of animal proteins in the diet of the people by analyzing the situation, based on the expenditure patterns. The objectives of the study include;

ii. To determine the income and expenditure distribution of sampled households;

iii. To determine the level of household expenditure on major animal proteins: and

iv. To determine the variables influencing household consumption of major animal proteins.

2.0 Importance of Animal Protein

Animal protein plays an important role in the food supply for the human society. This is as a result of relatively high content of essential amino acids in these types of proteins as compared to proteins of plant origin which contain mostly lower amount of essential amino acids (Adebayo, 2003). This comparison can be seen in Table 1. Proteins from animal sources have more of the essential amino acids than that of plants origin.

Table 1: Essential Amino Acid in different Food commodities

Essential amino acids	Meat	Fish	Wheat
Valine	50	52	42
Leucine	82	76	70
Isoleucine	52	50	42
Lysine	93	97	20
Threonine	47	45	29
Methionine + cystine	42	42	31
Phanylalanine + Tyosine	86	62	79
Tryptophane	13	10	13

Source: Adebayo (2003).

The importance of protein in the diet cannot be overemphasized, according to Swaminathan (2002), dietary on protein helps to replace the daily loss of proteins in the body. It also helps to provide proteins and certain hormones of protein nature. Moreover, it provides amino acids for growth of fetus in pregnancy and for the production of milk protein during lactation.

Despite the important role of protein in proper function of the body, the food habits and dietary patterns of different population groups in Nigeria have so far received limited attention (Enwonwu, 1983). Besides, people spend most of their income on starchy food which do not provide sufficient concentration of available good quality protein for normal child growth, good nutrition during pregnancy and lactation, and satisfactory recovery from stress, particularly that caused by frequent episodes of disease (Enwonwu, 1983). This lack of protein patronage in dietary may be as a result of ignorance about the importance of protein in the body (illiteracy), low income (poverty level) as well as scarcity of protein sources. In fact, according to Adegbola (1990) stated that only 8.32g of protein was consumed per day by an average Nigerian.

Therefore, about 60–80 percent of Nigerian are malnourished. The syndrome of protein energy malnutrition is still highly prevalent in the country and its synergistic interaction with infection poses a major public health problem. This problem therefore calls for immediate attention for the well-being of Nigerians Nutritional marasmus is also caused by severe deficiency of proteins and calories in the diet. The important features are growth retardation and severe wasting of muscle and loss of subcutaneous fat. The skin colour also changes (Khader, 2001). Maramic – kwashiorkor in children show the same signs as the two described above. Barbel (2001) added that millions of children die every year from nutrition related illness, and many more millions do not develop to their full potential because they are malnourished. Some common diseases are also diet related such as heart disease, stroke and diabetes (Susan, 2001)

3.0 Methodology

The study was carried out in Yola North and Yola South Local Government Areas of Adamawa State. Yola area is located on latitude 9°14'N and longitude 12°28'E(Fig 1). It also occupies the land area of about 8,068 square km and has an altitude of about 185.9m above sea level. Yola area has two distinct seasons which are the raining and dry season. The raining season start from April to October while the dry season starts from November to March. The annual rainfall is about 958.99mm, while the mean annual temperature is about 34.56°F. In 1997, Yola area was divided into two Local Government Areas, which are Yola South with Yola town as the capital and Yola North with Jimeta as the capital (MAUTECH, Student handbook, 2000).

Yola South Local Government Area is dominated by one major ethnic group (Fulani) with other tribes like Bata, Verre, Hausa, Kanuri and others and it has eleven wards. These includes: - Bako, Bole/Yoldepate, Mbamba. Mbamoi, Toungo,

Makama A and Makama B, Namtari, YoldeKohi, Adarawo and Ngurore wards. The total population is about 69,905 people which is projected to reach 101,362 in the year 2006.

Yola North which is a commercial centre comprises of different tribes these include Hausa, Igbo, Yoruba, Kanuri, and Higgi. Majority of the people residing in this area are civil servants, traders and few full time farmers. Yola North also has twelve wards namely:- Nepa, Nassarawo, Demsawo, Doubeli, Karewa, Jambutu, Limawa, Yelwa, Ajiya, Alkalawa, Rumde and Damilu wards. The population according to the 1991 census is about 106,158 people which is projected to reach 153,929 in the year 2006.

Information required for this study was gathered mainly from primary source. The data were collected at the household level with the use of well-structured questionnaires. Questions asked include those on socio economic and demographic characteristics of respondents such as gender, age, marital status, educational qualification, occupation, income and so on. The types of animal protein consumed, especially (meat, egg, milk and fish), quantities and frequency of consumption, amount spent on the protein types, preference to protein, constraints to consuming the protein type, food expenditure of household, and household composition. Personal interview was also carried out where the respondent cannot read or write, and the responses were entered into the questionnaire.

Simple random sampling technique was employed in the choice of 10 wards from the two Local Government Areas. These were proportional to size. Six wards were chosen from Yola North Local Government Area while 4 wards were chosen from Yola South Local Government Area. The selection of the respondents was also done through the use of simple random sampling. A total of two hundred (200) sample size (household heads) were used and served with questionnaires, and one hundred and sixty-one (161) were recovered and analyzed representing 80.5% of the total sample.

The proportionality factor used was:

$$\frac{\text{Population of each Local Government Area}}{\text{Population of both Local Government Areas}} \times 10$$

Both descriptive and inferential statistics were employed in analyzing the surveyed data. Simple statistics such as arithmetic mean and percentages were used in discussing the type of animal protein consumed, frequency of consumption, consumption preference and constraints to protein consumption by sampled households. To measure the influence of income and expenditure, income elasticity and marginal propensity to consume (MPC) were calculated. Regression analysis on the other hand was used to investigate the effects of some household factors such as income, household size, expenditure on protein (meat, egg, fish, milk), total monthly expenditure on food.

Description of terms

(i) **Income elasticity was computed using the formula**

$$Ey = \frac{\Delta HEAP}{\Delta INCO} \times \frac{INCO}{HEAP}$$

(ii) **Marginal Propensity to consume (MPC) was given as:**

$$\textbf{MPC} = \frac{\Delta HEAP}{\Delta INCO}$$

Where,

Ey = Income elasticity

Δ = Change

HEAP = Household expenditure on major animal protein sources per month.

INCO = Income of the household per month

iii. Multiple Regression Model

The aggregate protein expenditure function was estimated using a set of dependent variables; the full regression equation was expressed for 5 independent variables viz:

a) $HEME = \alpha + \beta_1 AGEH + \beta_2 EDUC + \beta_3 HTFE + \beta_4 GEND + \beta_5 INCO$

$\beta_1 LOCA + \beta_7 MARS + \beta_8 OCCU + \beta_9 HHSZ + UI$

Where;

HEME = Household expenditure on meat per month

AGEK = Age of the household head in years

EDUC = Education level of the household head stated in years of schooling.

HTFE = Households total expenditure on food per month (including animal protein) in Naira

GEND = Gender of household head (male = 1, Female = 0)

INCO Income of the household per month in Naira

LOCA = Location of the household (Yola north = 1, Yola South = 0)

MARS = Martial status of household head (Married = 1. single = 0)

OCCU = Occupation of the household head (Civil servant =1, others = 0).

HHSZ = Household size

α = Intercept

$\beta_1$to β_9 = Coefficient of independent variable estimated.

Ui =Error term.

(b) HEEI = $\alpha + \beta_1$AGEH + β_2EDUC + β_3HTFE + β_4GEND + β_5INCO + β_6LOCA + β_7MARS + β_8OCCU + β_9HHSZ + UI

(c) HEMI = $\alpha + \beta_1$AGEH + β_2EDUC + β_3HTFE + β_4GEND + β_5INCO + β_6LOCA + β_7MARS + β_8OCCU + β_9HHSZ + UI

(d) HEEG = $\alpha + \beta_1$AGEH + β_2EDUC + β_3HTFE + β_4GEND + β_5INCO + β_6LOCA + β_7MARS + β_8OCCU + β_9HHSZ + UI

(e) TEAP = $\alpha + \beta_1$AGEH + β_2EDUC + β_3HTFE + β_4GEND + β_5INCO + β_6LOCA + β_7MARS + β_8OCCU + β_9HHSZ + UI

Where

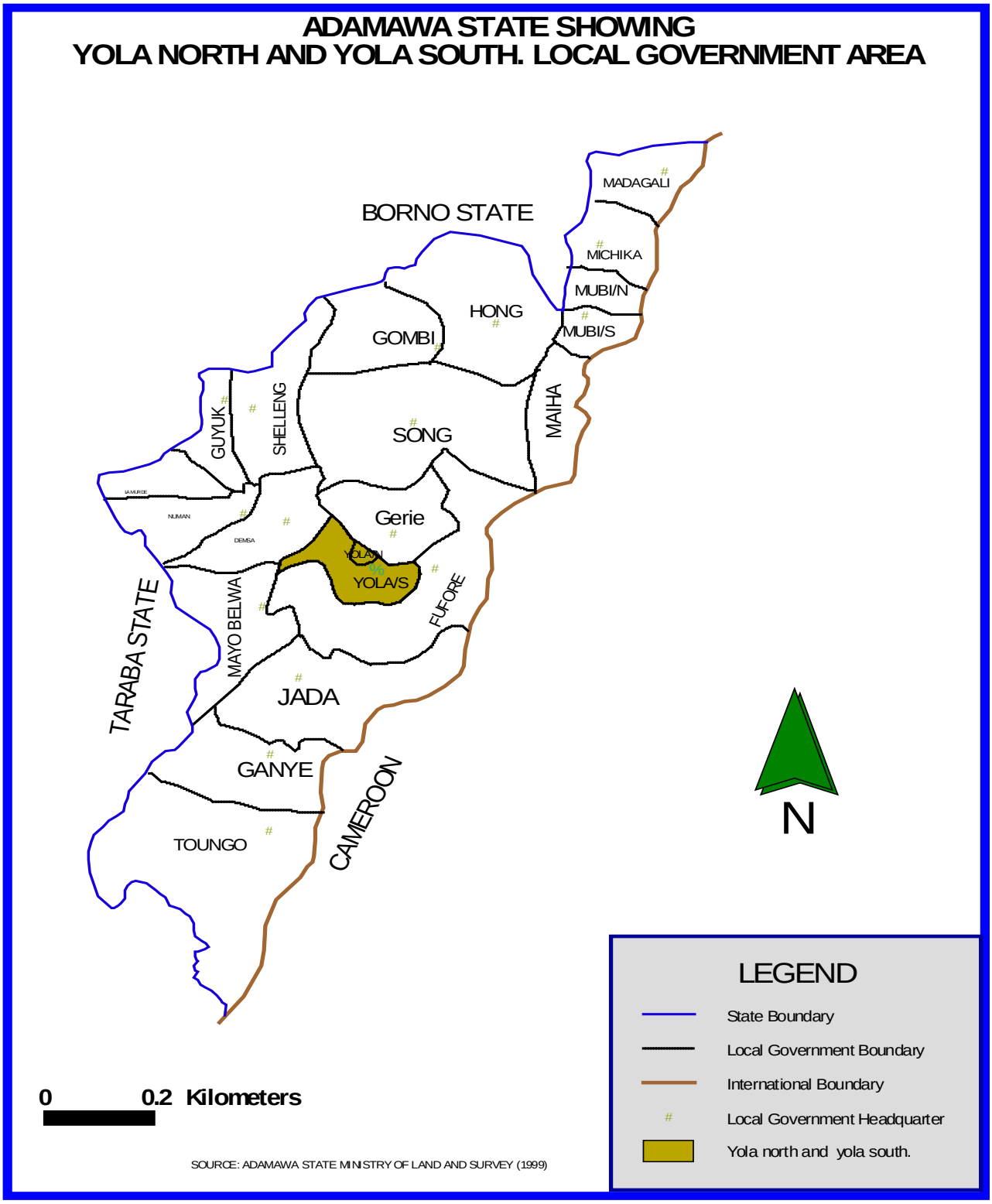
HEFI = Household expenditure on fish per month

HEMI = Household expenditure on milk per month

HEEG = Household expenditure on egg per month

TEAP = Total Household expenditure on major animal protein per month.

Other variables as defined earlier.


ADAMAWA STATE SHOWING
YOLA NORTH AND YOLA SOUTH. LOCAL GOVERNMENT AREA
BORNO STATE
MADAGALI
MICHIKA
MUBI/N
MUBI/S
HONG
GOMBI
MAIHA
SONG
GUYUK
SHELLENG
Gerie
YOLA/N
YOLA/S
FUFORE
MAYO BELWA
TARABA STATE
JADA
GANYE
TOUNGO
CAMEROON
N
0 0.2 Kilometers
LEGEND
State Boundary
Local Government Boundary
International Boundary
Local Government Headquarter
Yola north and yola south.
SOURCE: ADAMAWA STATE MINISTRY OF LAND AND SURVEY (1999)

4.0 Socio-economic Characteristics of the Respondents

The socioeconomic characteristics discussed here include, gender of the household head, age of the household head, occupation of the household head, marital status, educational level of the household head and household size.

Table 2 : Socioeconomic Characteristics of the Respondents

Variable	Frequency	Percentage (%)	Average
Gender			
Male	138	85.7	
Female	23	14.3	
Age (Years)			
21 – 40	70	43.5	33.9
41 – 60	82	50.9	48.9
61 and above	9	5.6	67.1
Marital Status			
Single	31	19.30	
Married	130	80.70	
Occupation			
Civil Service	125	77.6	
Others	36	22.4	
Education			
No formal Education	8	5.0	
Primary School	7	4.3	
Secondary School	20	12.4	
Tertiary Education	126	78.3	
Household Size			
1 – 5	70	4	43.5
6 – 10	77	8	47.8
11 – 15	12	12	7.5
16 – 20	1	20	0.6
Above 20	1	40	0.6

Source: Field Survey, 2005

As shown in Table 2, about 86% of the household heads were males while about 14% were females. This shows that most of the household heads were males. In the study area male usually bears the responsibility of providing for the family, even though we have some female headed households.

The same Table shows that 43.5% percent of the household heads were between ages 21 and 40years with an average age of 33.9 years, 50.9 percent of the household heads were between 41 and 60 years with an average age of 48.6 years while 5.6% of the household heads falls within 6lyears and above with an average age of 67.1 years. The result reveals that the majority of the bread winners were within the age bracket of 41 – 60 years followed by the age bracket of 21– 40 years. These age brackets also constitute the active working population while the age bracket of 61 – 80 years constitutes the non working population and they were few.

Moreover, about 81 % of the respondents were married as revealed by the Table while less than 20% were unmarried. The results showed that majority of the household heads are married and are therefore responsible.

As indicated by the same Table, about 78% of the respondents are civil servants while less than 30% engaged in other jobs such as farming, trading and so on. This figures revealed that civil servants constitute the majority of sampled household heads. This implies that Yola North and South are mostly civil service areas.

The same result shows that household heads with no formal education constitute only 5.0 percent of the total sample. Those with primary school Education were 4.3 percent. 12.4% had secondary school education while the majority (78%) had tertiary Education. The result revealed that majority of the household heads had one form of education or the other.

Household size has been shown to influence the type of food being consumed by the household as shown in the Table, about 44% of the sampled household has an

average of 4 persons per household, about 48 percent has an average of 8 persons per household, 0.6 percent of the sampled household has an average of 20 and 40 persons respectively in their domain while the overall average is 7 persons per household. This implies that each household has an average of 7 persons. This will have an effect on consumption of animal protein

4.2 Household Income and Expenditure

The analysis on household income and expenditure includes: household income distribution, expenditure on food, expenditure on major animal protein, expenditure in relation to income, income elasticity and marginal propensity to consume.

Table 3: Household's Income Distribution

Income per Month (₦)	Frequency	Total Income Per month (₦)	Average Income per month (₦)	Percentage
Below 20,000	77	1,025060.5	13,312.47	47.8
20,000 – 49,000	61	1,736,599	28,468.84	37.9
50,000—99,000	18	1,011,000	56,166.67	11.2
100,000 & above	5	8, 39600	167,920	3.1
Total	161	4,612,259.5	28,647.57	100

Source: Field survey, 2005

Table 3 reveals that about 48% of the household earns an average income of ₦13, 312.47 per month; about 38% of the household earns an average income of ₦28, 468.84 per month, about 11 % of the household earns an average income of ₦56, 166.67 per month, while only 3% of the household earns an average income of ₦167,

920.00 per month. This result shows that the majority (about 86%) of the household earns an average income of about ₦28, 000.00 per month.

Table 4: Household Expenditure on Different Food types

Description	Expenditure Per month(₦)	Mean Expenditure per month(₦)	Percentage
Animal Protein	692,920.00	4,303.85	37.2
Carbohydrate	969,846.07	6,923.89	52.0
Soup ingredients	146,500.14	918.15	7.9
Others	54,450.12	338.20	2.9
Total	1,864.730		100

Source: Field Survey, 2005.

As shown in Table 4, households spent an average of ₦ 4,303.85 on animal proteins per month representing about 37 percent of the total amount was spent on food; they also spent 52% on Carbohydrate foods, about 8% on soup ingredients and about 3% on other foods respectively. This result indicates that household spent more on carbohydrate food possibly due to their low-income status. This is because carbohydrate foods are relatively cheaper compared to animal protein food sources.

Table 5: Household Expenditure on Major Animal Protein Sources

Description	Expenditure per Month (₦)	Mean Expenditure per Month (₦)	Percentage
Meat	347,500.00	2,131.90	50.15
Fish	196,580.00	1,206.01	28.37
Milk	102,640.00	629.69	14.81
Egg	46,200.00	283.44	6.67
Total	692,920.00		100

Source: Field Survey, 2005

Table 5 above shows that about 50% of the total amount spent on animal protein was expended on meat per month. This is followed by expenditure on fish which forms about 28% while that of milk and egg were about 15% and 7% respectively. The result indicates that expenditure on meat is the highest; it formed half of the total expenditure on major animal protein.

Table 6: Average Household Expenditure in Relation to Income

Income per Month (₦)	Animal Protein per Month (₦)	Other Food per Month (₦)	Non Foods & savings per Month
13,312.47	3,258.31	3,628.57	6,425.59
28,468.84	4,515.08	8,805.25	15,148.51
56,166.67	6,108.89	13,996.67	36,061.11
167,920	11.330	20,670.00	135,920.00

Source: Field Survey 2005

The result in Table 6 shows that household with an average income of about ₦13,000.00 per month spent an average of ₦3,258.31 on animal protein, ₦3,628.57 on other food items and ₦6,425.59 on non food items and savings. Households with an average income of about ₦28,000.00 spent ₦4,515.08, ₦8,805.25 and ₦ 15,148.50 on animal protein sources, other food items and non food items and savings respectively. On the other hand households with an average income of ₦ 56,000.00 spent ₦ 6,108.89, ₦ 13,996.67 and ₦ 36,061.11 on animal protein sources, other food items and non food items/savings respectively per month, while households with an average income of about ₦168, 000.00 spent ₦11, 330.00, ₦20, 670.00 and ₦135.920.00 on animal protein sources, other food items and non food items/saving respectively per month.

It was observed that household with high income did not spend much on food consumption but greater part of their income was spent on non- food items and or

saved. It therefore shows that when income increases consumption expenditure will only increase by a smaller amount. Moreover household consumption of the various items increased with increase in income.

Table 7: Income Elasticity (Ey) and Marginal Propensity to Consume (MPC) in Relation to Household Income

Inco(N)	Heap(N)	Inco(N)	Heap(N)	MPC	Ey
3,312.47	3,258.31	-	-	-	-
28,468.84	4,515.08	15156.37	1,256.77	0.08	0.3
56,166.67	6,108.89	27,697.83	1,593.8	0.06	0.4
167,920.00	11,330	111,753.33	5,221.11	0.05	0.5

Source: Field survey, 2005

Income elasticity and marginal propensity to consume were determined using the values obtained from the average expenditure in relation to income as shown in Table 7.TheTable reveals that when income changes from ₦13, 312.47 to ₦28,468.84, the elasticity was 0.3 when income changes to ₦56,166.67 the elasticity was 0.4 and when income changes to ₦ 167,920.00 the elasticity was 0.5. The figures show that the coefficient of income elasticity marginal propensity to consume were obtained from the average household with respect to changes in income was positive but less than 1, indicating that the household expenditure on major animal protein sources rises less than proportionate to the rise in the household income. This also revealed that animal protein source as a good is a necessity.

It was also observed that MPC is assumed to be positive and less than unity at all levels of income. The ratio also shows decrease in MPC as income increases meaning that the MPC is low in the case of high income household and high in the

case of low income household. This also indicates that as income increases people shift their pattern of expenditure to non-food items and save part of the income.

4.3 Determinants of Households Expenditure on major animal protein products.

Expenditure on four animal protein products were analyzed in this study, this include meat,fish,milk and egg. Separate regression analysis was estimated for each of the animal protein products while the fifth regression analysis was carried out for the pooled data. The result for the analysis on meat is shown in Table 8.

Table 8 Regression Result for Household Expenditure on Meat

Variables	Coefficient	T-Ratio	R^2	F-Ratio
Constant	2.8701***	23.53	0.44***	13.10
AGEH.	-0.000723	-0.39		
EDUC	0.007159	1.21		
HTFE	0.0002232***	7.02		
GEND	-0.08903	-1.45		
INCO	-0.0000063	-0.91		
LOCA	-0.05468	-1.46		
MARS	0.14714**	2.55		
OCCU	0.04825	1.03		
HHSZ	0.006420	1.02		

Source: Field Survey, 2005

***Indicates significance at 1 % level

**indicates significance at 5% level

*Indicates significance at 10% level

In Table 8, the estimation of parameter showing the relationship between total amounts spent on meat consumption and socio-economic characteristics reveals that out of the 9 variables used only two were significant at 1% and 5% level respectively. These are total household expenditure on food and marital status. They were the main factors influencing household total expenditure on meat in the study area. Variables such as educational level, occupation and household size were not significant but they have positive influence on household expenditure on meet. The R^2 of 0.44 shows that 44% of the household expenditure on meat in the study area was explained by the variables included in the model. The significance of the R^2 as indicated by the value of the F statistic indicates that the equation is in good fit. This result implies that the higher the amount spent on total food consumption, the higher the amount spent on meat consumption. The greater the number of married household heads, the higher the expenditure on meat.

Table 9: Regression Result for Household Expenditure on Fish

Variables	Coefficient	T-Ratio	R^2	F-Ratio
Constant	2.6358***	13.68	0.30***	547
AGEH	-0.000329	-0.11		
EDUC	0.01707*	1.68		
HTFE,	0. 0000223***	4 55		
GEND	0.20740**	-2.08		
INCO	-0.0000009	-0.81		
LOCA	0.00642	0.11		
MARS	0.25385***	2.73		
OCCU	-0.05110	-0.68		
HHSZ	-0.00456	-0.41		

Source: Field Survey, 2005

The regression result in Table 9 indicates an R^2 of 30% which is significant at 1% level meaning that the equation is in good fit. The same table shows that apart from the constant, 4 other coefficients of independent variables were significant. These include those of educational level of the household head, the total household expenditure on food, gender of the household head and marital status of the household head. They were significant at 10%, 1%, 5% and 1% levels respectively.

Table 10: Regression Result for Household Expenditure on Milk.

Variables	Coefficient	T-Ratio	R^2	F-Ratio
Constant	1.6162***	6.39	0.366***	6.35
AGEH.	0.003625	1.00		
EDUC	0.06243***	434		
HTFE,	0.00001281**	2.20		
GEND	-0.0868	-0.71		
INCO	0.00000116	0.94		
LOCA	0.14080*	1.91		
MARS	0.1805	1.65		
OCCU	0.16269*	-1.78		
HHSZ	-0.00727	-0.53		

Source: Field Survey, 2005

Table 10 shows the factors determining household expenditure on milk. The Regression result has an R^2 of about 37% and it's significant at 1% level showing that the equation is in good fit. Four out of the 9 variables included in the model were significant at 1%, 5% and 10% levels respectively indicating that they were the main factors influencing household expenditure on milk in the study area. These four variables are educational level of the household head (1%), total household expenditure on food (5%), location of the household (10%), and occupation of the household head (10%). Other variables like age and marital status of the household head were not significant, but have positive influence on milk expenditure to some

extent. Household size however, has negative impact on expenditure on milk. This result implies that the higher the level of education of the household head, the higher the expenditure on milk. This is understandable since an educated person is expected to know the nutritive value of milk. The result also indicates that the more the number of people in the household, the lower the expenditure on milk, this borders on the expensive nature of the commodity.

Table 11: Regression Result for household Expenditure on Egg.

Variables	Coefficient	T-Ratio	R^2	F-Ratio
Constant	2.4754***	10.23	0.337***	3.91
AGEH.	0.002016	0.69		
EDUC	0.01220	0.85		
HTFE,	000001369***	321		
GEND	0.2447**	-2.39		
JNCO	-0.00000083	-0.93		
LOCA	0.10732*	1.79		
MARS	0.13479	1.53		
OCCU	-0.05285	-0.78		
HHSZ	0.02068*	-1.95		

Source: Field Survey, 2005

The result in Table 11 shows that 4 out of the 9 variables used in the model for egg were significant at 1%, 5% and 10% levels indicating that they are the major factors influencing household expenditure on egg in the study area. These factors include; total household expenditure on food, gender of the household head, Location of the household and household size. Other variables such as age, educational level and marital status of the household head were not significant but they have positive influence on household expenditure on egg. The result also indicates an R^2 of about 34% which is significant at 1% level, showing that the model is in good fit. The implication of the result is that: the more the household

expenditure on food the more the expenditure on egg. Moreover, the negative coefficient of gender shows that female headed households consume more egg than male headed households while positive coefficient of location indicates that household in Yola North consume more egg than those in Yola South. Besides the negative coefficient of household size implies that household with more people (that is large family size) consume less eggs than household with less people.

Table 12: Regression Result for Household pooled Data.

Variables	Coefficient	T-Ratio	R^2	F-Ratio
Constant	2.9854***	26.41	0.549***	20.40
AGEH.	0.002398	1.40		
EDUC	0.013610**	2.48		
HTFE,	0.00002673***	9.07		
GEND	0.1O464*	-1.85		
INCO	-0.00000019	-0.30		
LOCA	-0.00072	-0.02		
MARS	0.11123**	2.08		
OCCU	0.02818	0.65		
HHSZ	-0.008796	-1.51		

Source: Field Survey, 2005

The model for the pooled data that is for the four major animal protein products is shown in Table 12. The model has an R^2 of about 55% and it's significant at 1% level meaning that it is in good fit. The coefficients of four independent variables are significant. This includes that of education of the household head (at 5% level), total household expenditure on food (at 1%), gender of the household head (at 1%) and marital status of the household head (at 5%). The education, expenditure on food and marital status of the household head influenced household expenditure on the major animal protein products positively while the gender of the household head is negatively related to household expenditure on the protein products which means that male head of households spend less on major animal protein products

than their female counterparts. Moreover household size has a negative influence on household expenditure on major animal protein products.

Conclusion and Recommendation

Despite the importance of animal protein product in the diet for the human society, the rate of consumption and expenditure was low compared to carbohydrate foods in the study area. This is to say that the daily protein requirement of an individual by FAO/WHO/UNU is yet to be realized in the study area. The contributing factor to the low patronage of animal protein in dietary is low income and large household size. Judging from the result, majority of the household in the study area live below the poverty level with little income of an average of ₦13, 312.47 per month giving no room for surplus food and leaving them with no option than to go for cheaper food sources especially carbohydrate food sources.

The size of the household also influence the amount spent on animal protein sources. There was an indication that larger size households have relatively lower food expenditure due to the fact that these household categories have the lowest income in the study area.

In spite of the fact that, about 78.3% of the respondent passed through tertiary education their rate of expenditure on major animal protein were relatively low compare to their educational status. This may be as a result of their low income status. The above problem therefore calls for immediate attention from the government, non-governmental bodies, or individuals to alleviate the situation or else more people will still be undernourished in the years to come.

Based on the findings of the following recommendation are hereby proffered:

Reduction on income taxations will raise the disposable income and enhance household's consumption and expenditure on major animal protein as well as other food sources.

Introduction of informal education to educate people on the clinical and sub-clinical repercussion of not taking enough of animal protein in their diet. This will go a long way in reducing the rate of malnutrition in the study area and nation at large.

Public enlightenment campaigns should be embarked upon in the study areas as well as the nation to enlighten people on the importance of protein-energy deficiencies so as to enhance consumption of animal protein products.

The importance of animal protein in the dietary should be properly communicated to the public both in urban and rural areas. This will help to increase the rate of consumption expenditure on animal protein sources.

Individuals, government, and non-governmental organization should invest in livestock production in order to make these animal protein products available in large quantity for consumption.

Credit facilities through banks and other financial institutions should be made available to livestock farmers and procedures should be made very simple in order to boost livestock production in the study area and the nation as a whole.

Male heads of households should be encouraged to spend more on major animal products since the pooled data result revealed inverse relationship on their mode of spending on these protein sources.

Family planning education should be intensified in the study area and the nation as a whole to enlighten people on the danger of giving birth to so many children without the means of seeing to their welfare since household size is the major determinant of the household expenditure on the major animal protein products.

References

[1] Adebayo E.F. (2003). "Fishery Economics" *in Aquaculture in the Tropics*. Theory and Practice by Ben A. Haruna, Al-Hassana publishers. p400 - 402

[2] Barbel D. (2001). 2020 "Vision for Food, Agriculture and the Environment. Sustainable Food Security for all by 2020", Proceedings of an International Conference Sept 4 – 6, 2001 Bonn, Germany. International Food Policy Research Institute Washington D. C., p.53.

[3] Enwonwu C, O. (1983). "A review of National requirement and Nutritional status of Nigerians" in *Nutrition and Food Policy in Nigeria*. Tola Atinmo and Laolu Akinyele (eds). Published by National Institute for Policy and Strategies studies. pp22 - 23

[4] FAO, (1997). Food for All. Rome, Italy. p.1

[5] Khader, V. (2001). *Food Sciences and Technology*. Published by Indian council of Agricultural Research, New Delhi. pp271 – 324

[6] MAUTECH Student Handbook (2000). Modibbo Adama University of Technology, Yola. Printed by Sub-Saharan Press Limited, Lagos. p.7

[7] Susan, H. (2001). Dietary Changes: 2020 "Vision for Food, Agriculture, and the Environment Sustainable Food Security for all by 2020" Proceedings of an International Conference, Sept 4 – 6 2001 Born, Germany International Food Policy Research Institute Washington.

[8] Swaminathan, M. (2002). *Hand book of Food and Nutrition*, The Bangalore printing and publishing Co. Ltd. pp22 – 25

[9] WHO (1985). "Energy and Protein Requirement" Report of a Joint FAO/WHO/UNU Expert consultation Technical Report Series 724 World Health Organization Geneva 195. pp 12 – 13, pp 7l – 141.