Determinants of Food Demand among Rural Farming Households in Ogun State, Nigeria

Otunaiya A. O. [1], Adeyonu A. G[2]. and Ajiboye B. O[2]

[1*]Department of Agricultural Economics and Farm Management, College of Agricultural Sciences, Olabisi Onabanjo University, Yewa Campus, Ayetoro,Ogun State, Nigeria.
[2]Department of Agricultural Economics and Extension, College of Agricultural Sciences, Land Mark University, Omu-Aran, Kwara State, Nigeria.
Corresponding Author E-mail: *aootunaaiya@gmail.com*

Abstract

This study examined the determinants of food demand among rural farming households in Ogun state, Nigeria. A multi-stage sampling technique was used to select 120 rural farming households from twenty villages. Primary data used in the study was collected with the aid of well-structured questionnaire. The data collected were analysed using descriptive statistics and Quadratic Almost Ideal Demand System (QUAIDS). Results of the analyses showed that among the various food categories considered, grains had the largest share (43%) of household total food expenditure. Food prices as well as households' socioeconomic characteristics were the main determinants of food demand in the study area. While some of these variables influenced demand for certain categories of food positively, others had negative influence. Grains, roots/tubers, fruits/vegetables and fats/oil are expenditure inelastic, while animal protein and other food groups were elastic. Own price elasticities were all negative. The results of cross-price elasticities estimates showed that all food groups were net substitutes. To ensure adequate demand for the various food categories, ensuring stability of food prices and upward review of general income level will be a policy option.

Keywords: Demand elasticities, food demand, food expenditure, QUAIDS, rural farming households.

Introduction

The agricultural sector in Nigeria is the most important non-oil economic activity; and is also the single largest employer of labour force, employing about 70%of its workforce (National Bureau of Statistics (NBS), 2009) and contributed 40.1% and 22.0% of Gross Domestic Products (GDP) in 2010 and 2014 respectively (NBS, 2014). Also, it is more of a pillar of national food security.

Food is a basic human need and a major source of nutrients for man's existence. Food is of high importance in matter of human well-being and economic productivity.

Eating good food is vital for a healthy productivity. Eating good food is vital for a healthy and active life. Many people do not eat well because of poverty and lack of nutritional education (Omoteso and Muhammad-Lawal, 2009; Olarinde and Kuponiyi, 2005). The major components of food are carbohydrates, protein, fats and oil, mineral salt, vitamins which are essential for life but are in short supply. Evaluation of the nutritional status of individuals and groups is an exercise of vital importance in public health and feasible indicators of standard of living. High rates of malnutrition may be attributed to poor environmental sanitation, overcrowding, lack of preventive and curative health services and other socioeconomic, educational and cultural factors; although feeding practices have been recognised as one potential important determinant of infant malnutrition (Olatidoye *et al.,* 2010).

Despite the fact that the world food production has doubled during the past three decades the number of malnourished people are soaring above 900million around the world. Nigeria is listed by FAO among nations of the world that are at the moment technically unable to meet their food needs from rain fed agriculture with low level of inputs and appear likely to remain so even at intermediate levels of inputs (NINCID, 1999). As observed by Bamiro (2011), food insecurity problem become more germane in view of the reality that Nigeria's agriculture, food production in particular, rest in the hand of resource poor, small holder peasant farmers who live in the rural areas. With the growing population of the country, food production is not increasing in a way that can meet up with the high demand (Ojo, 2003). Nigeria annual population growth rate is put at 2.83%, while food production is increasing at the rate of 2.5% annually and food demand is increasing at 3.5% (NBS, 2009). This obvious disparity between food demand and supply coupled with population pressure and resultant food price hike has led to a big gap between food availability and requirement with an enormous challenge on the national food security.

Aromolaran (2001) confirmed that Nigeria is still struggling to meet up with the minimum food and nutrient requirement. The evidence of poor nutrition is reflected particularly among low income groups. It has also been estimated that 7,300 children die of malnutrition annually in Nigeria before they reach the age of four years; while between 73,000 and 84,000 infants suffer from malnutrition every year. The preschool children are not left out of the ill wind of malnutrition blowing in Nigeria (Ajayi and Chukwu, 2008).

According to FAO (2008), food consumption in kcal/person/day in Nigeria increased from 2370 in 1990-1992 to 2560 in 1995-1997 and finally 2600 in 2003-2005, with percentage of undernourished population decreasing from 15%, in 1990-1992 to 10% in 1995-1997 and finally to 9% in 2003-2005. In absolute terms, though there was a decrease in undernourished population in Nigeria from 14.7 million in 1990-1992 to 10.8 million in 1995-1997, this figure increased to 12.5 million people in 2003-2005. In Nigeria, many people within the country are food insecure because of high prevailing poverty level and poor performance of the Nigerian agricultural system (Ojiako *et al.*, 2014; Otunaiya and Ibidunni, 2014). Thus, majority of Nigerians are poor, lack physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs.

The households living in rural and urban areas make expenditure on different commodities to attain utility and satisfaction. The expenditure on food commodities and items are the most important in the household behaviour as food is basic nutritional ingredient for every human being. Therefore, in the analysis of consumer behaviour, the food consumption is said to be the expenditure made by the consumer on different food commodities, which he purchases to meet the daily food needs such as expenditure on maize, rice, beans, vegetables, fruits, meat fish and such other food items. The consumption of these food items by any household is generally the function of income of household, prices of commodities, taste of the consumer and other factors. Consumption pattern is considered as one of the most important indicators of economic development in a country. In theory, the change in consumption pattern is determined by price and income changes together with changes in

tastes and preferences. As what is evident in most developing countries, food constitutes the largest share of household expenditure and within the food category, 'staple food' is the most dominant consumption category (Fashoghon and Oni, 2013).

Also, according to Olarinde and Kuponiyi (2005), households' consumption of carbohydrate/starchy food is significantly higher than of protein and vitamins.

It is important to ascertain the factors which influence the demand for various food categories among farming households in rural areas of Ogun state, hence, the determinants of food demand among rural farming households is investigated.

Materials and Methods
This study was conducted in Ogun state, Nigeria. A multistage sampling procedure was used to select the respondents. At the first stage, the Local Government Areas (LGAs) in the state were stratified into urban and rural areas as indicated by the Ministry of local government affairs office of the state. The second stage involved a random selection of 2 rural LGAs. At the next stage, there was random selection of ten villages from each of the selected LGAs to give a total of twenty villages. The list of farming households from the villages selected was obtained from state's Agricultural Development Projects (ADPs). At the fourth and final stage was the random selection of representative farming households using probability proportionate to the population size of the villages selected. In all, 150 questionnaire were distributed but only 120 questionnaire were found useful for the purpose of the research. The information gathered from the respondents include respondents' socioeconomic characteristics, household expenditure and consumption pattern as well as prices of various food classes in the study area.

Descriptive statistics such as frequency, percentage and expenditure share were used to analyze the households' socioeconomic characteristics and expenditure share on food categories. Quadratic Almost Ideal Demand System (QUAIDS) was used to analyze the determinants of food demand.

The use of Almost Ideal Demand System (AIDS) in consumption studies abound in literature. Following Fashogbon and Oni (2013), Otunaiya *et al.* (2013), Otunaiya and Shittu (2014); the Quadratic Almost Ideal Demand System (QUAIDS) budget share equation used in the study is specified implicitly as follows:

$$w_i = \alpha_i + \sum_{i=1}^{j} \gamma_{ij} \ln p_i \, \beta_i \ln\left[\frac{m}{a(p)}\right] + \frac{\lambda_i}{b(p)} \{\ln[\frac{m}{a(p)}]\}^2 + \sum_{s=1}^{L} \delta_{is} z_{si} + \varepsilon_i \qquad (1)$$

Where:
w_i = household's expenditure share of ith food category, for i=1, 2, 3, 4, 5 and 6
w_1 = share of grains
w_2 = share of roots and tubers
w_3 = share of fruits and vegetables
w_4 = share of animal protein

w_5 = share of fats and oil
w_6 = share of other food (those not included in the five categories listed above)
p_i = price of food ith (**N**/grain equivalent kg), for i=1, 2, 3, 4, 5 and 6
p_1 = price of grains (**N**/kg)
p_2 = price of roots and tubers (**N**/kg)

Otunaiya A. O., et al.

p_3=price of fruits and vegetables (**N**/kg)
p_4=price of animal protein (**N**/kg)
p_5=price of fats and oil (**N**/kg)
p_6=price of other food (**N**/kg)
m=household's total expenditure on all food
in the demand system (**N**/week)
zi=socioeconomic variables

$$\mu_i \equiv \frac{\partial w_i}{\partial \ln m} = \beta_i + \frac{2\lambda_i}{b(p)}\{\ln[\frac{m}{a(p)}]\} \tag{2}$$

$$\mu_{ij} \equiv \frac{\partial w_i}{\partial \ln p_j} = \gamma_{ij} - \mu_i\left[\alpha_j + \sum_k \gamma_{jk}\ln p_k\right] - \frac{\lambda_i\beta_i}{b(p)}\left\{\ln\left[\frac{m}{a(p)}\right]\right\}^z \tag{3}$$

The expenditure elasticities are derived by:

$$e_i = 1 + \frac{\mu_i}{w_i} \tag{4}$$

The uncompensated price elasticities are derived by:

$$e_{ij}^u = \frac{\mu_{ij}}{w_i}\delta_{ij} \tag{5}$$

The Hicksian or compensated price elasticities are obtained from the Slutsky equation as:

$$e_{ij}^c = e_{ij}^u + w_j e_i \tag{6}$$

Results

Socioeconomic characteristics of the respondents

The results of the analysis on socioeconomic characteristics of the respondents are presented in Table 1. As shown in the table, comparatively, majority (35.0%) of the farmers in rural areas of Ogun state were older than 50 years while only about 10.0% were below 31 years of age. The mean age and standard deviation of the respondents stood at 56 and 13 years respectively. As shown in the table, males (50.8%) and females (49.2%) were almost equally involved in farming in the study area.

Furthermore, well above three-quarters (91.6%) of the respondents were married while about 3%, 2% and 4% respectively were single, divorced and widowed respectively. The majority of the respondents did not have formal education while the mean year of schooling was 5 years and 4.54 years as standard deviation. Also, more than two-thirds (72.5%) of the respondents' household size was between 4 and 6 persons with the mean household size as 5; which could likely raise their demand for food. Contrary to expectation, more than 80% of the respondents were not visited by the extension agents during the planting season prior to data collection. About 70% of the farmers had other sources of income apart from farming.

Rural farming households' demand for various food categories

Table 2 presents a summary of the food expenditure shares of the various food items consumed by the sampled households. It is evident from the table that grains constitute the largest share of household total food expenditure which stood at 43%. This was followed by roots and tubers (20%); the result is in line with the findings of Ashagidigbi *et. al*, (2012). Expenditure share on fats and oil constituted the lowest of the households' total food expenditure. This may however, be due to the fact that this category of food is sparingly consumed in the area. The findings concur with that of Bopape and Myers (2007) who reported that 5% of rural household total food expenditure in South Africa is on fats and oil.

Factors affecting the demand for various food classes by rural farming households in the study area

The result of the estimated coefficients for the QUAIDS model is presented in Table 3. As shown in Table 3, R^2 values of about 0.587, 0.681, 0.655, 0.702, 0.626 and 0.726 show that about 59%, 68%, 66%, 70%, 63% and 73% of the variations in budget share of grains, roots and tubers, fruits and vegetables, animal protein, fats and oil and other food respectively were explained by their prices, income and household socioeconomic factors.

The results of the analysis as revealed in Table 3 show that respondents' age (0.060) and household size (0.129) positively affect the share of grains in the household total budget while price of animal protein (-0.282) and grain own price (-0.091) had a negative effect of reducing the share of grains in the household total budget.

Table 1: Socioeconomic characteristics of household heads

Socioeconomic group	Frequency	Percent
Age of the household head (Years)		
<31	13	10.9
31-40	25	20.8
41-50	40	33.3
>50	42	35.0
Mean	55.6	
Standard deviation	13.08	
Sex of the household head		
Male	61	50.8
Female	59	49.2
Marital status		
Single	3	2.5
Married	110	91.6
Divorced	2	1.7
Widow/widower	5	4.2
Years of schooling		
0	44	36.7
1-6	31	25.8
7-12	27	22.5
>12[1]	18	15.0
Mean	5.03	
Standard deviation	4.54	
Household size		
<4	19	15.8
4-6	87	72.5
7-8	12	10.0
>8	2	1.7
Mean	6.2	
Standard deviation	2.56	
Extension visits		
Yes	21	17.5
No	99	82.5
Other means of livelihood		
Yes	85	70.8
No	35	29.2
Sample size	120	100

Table 2: Average Monthly Expenditure Share of Food Categories of Rural Farming Households

Class of food	Mean	Std. Deviation
Proportion of grains	0.43	0.21
Proportion of roots and tubers	0.20	0.07
Proportion of fruits and vegetables	0.17	0.06
Proportion of animal protein	0.07	0.04
Proportion of fats and oil	0.05	0.02
Proportion of other food	0.08	0.03

Table 3: Determinants of Rural Farming Households' Food Demand

Variables	Grains	Roots/Tubers	Fruits/ vegetables	Animal protein	Fats/ Oil	Other/ food
(Constant)	-0.543*	0.333**	0.257**	0.796	0.503**	0.1083*
	(-3.248)	(2.286)	(1.975)	(1.217)	(2.209)	(2.557)
Price of grains	-0.091*	-0.699	-0.110	-0.214*	-0.044	-0.056
	(3.468)	(-0.724)	(-0.964)	(-4.716)	(-0.427)	(-1.042)
Price of roots/tubers	0.520	-0.453**	-0.818	-0.091**	-0.114	0.024
	(0.624)	(2.687)	(-1.436)	(--2.153)	(-1.286)	(1.214)
Price of fruits/vegetables	-0.642	0.032	-0.057	-0.362*	0.089	-0.086
	(-0.868)	(0.536)	(-1.008)	(-6.119)	(0.626)	(-1.170)
Price of animal protein	-0.282*	0.082	0.442	-0.181*	-0.489*	0.052
	(-4.718)	(1.153)	(1.119)	(-4.333)	(-2.515)	(0.333)
Price of fats/oil	0.930	0.019	-0.051*	0.146	-0.044	-0.026
	(1.427)	(1.286)	(-1.662)	(1.515)	(-0.427)	(-0.579)
Price of other food	-0.038	0.045	0.022	0.055	0.068	-0.098
	(-1.042)	(1.214)	(0.170)	(0.333)	(-0.806)	(-1.470)
Age	0.060***	0.059	0.038	0.312	0.054	0.069**
	(1.653)	(0. 845)	(0.140)	(1.040)	(0.341)	(2.479)
Sex	-0.007	-0.022	0.055	0.003	0.071	0.008
	(-0.086)	(-0.237)	(0.408)	(0.066)	(0.820)	(0.262)
Household income (N)	0.010	-0.010	0.013*	0.190*	0.947*	0.074***
	(1.281)	(-1.229)	(3.642)	(3.872)	(3.288)	(1.647)
Years of schooling	0.017	0.069	0.055	-0.046	0.035	0.018
	(0.214)	(0.624)	(1.034)	(-1.137)	(0.407)	(0.638)
Household size	0.129*	0.152**	-0.088	-0.264	0.092	-0.063
	(4.253)	(2.337)	(-0.468)	(-2.825***)	(-1.005)	(-1.010)
R-square	0.587	0.681	0.655	0.702	0.626	0.726

Note: *figures in parentheses are t ratios, ***, **,* are significant levels at the 1%, 5%, and 10% level, respectively.*

Expenditure elasticities of the various food categories

The results of the analysis of expenditure elasticities of various food classes are presented in Table 4. As shown in the table, Animal protein and other food have positive and significant but highly elastic expenditure elasticities coefficients of 1.111 and 1.969 respectively. The elasticities coefficients for Grains (0.965), Root/tubers (0.420), Fruit/vegetables (0.057) and Fat/oil (0.182) are all statistically significant and inelastic.

Table 4: Expenditure Elasticities of Various Food Categories

Food categories	Expenditure elasticities
Grains	0.965*** (0.155)
Roots/tubers	0.420** (0.170)
Fruits /vegetables	0.057*** (0.010)
Animal protein	1.111*** (0.108)
Fats/oil	0.182**(0.095)
Other food	1.969*** (0.303)

Note: ****, **,*, coefficients are significant at the 1%, 5%, and 10% level, respectively.*
Source: *field survey, 2014*

Own price and cross price elasticities of the food classes:

The effects of the change in food own price and those of other food classes on the demand for the particular food class were determined using own and cross price elasticities and the results are presented in Table 5. The diagonal estimates on the table represent the own price elasticities while on the off diagonal are the cross price elasticities. The own price for grains, root/tubers, fruit/vegetables, Animal protein and fat/oil are -0.724, -0.182, -1.325, -1.472 and -1.146 respectively.

Discussion

The results of the socioeconomic analysis (Table 1) shows that the majority of the farmers in the study area are old which may have effect on the level of their involvement in farming activities which is said to be strenuous and hence, on household demand for certain categories of food. This is however, in sharp contrast with the findings of Ashagidigbi *et al*. (2012) and Amao (2013), who reported a lower mean age for farmers in Nigeria, but concurs with the growing evidence of ageing farming population in

Table 5: Own and cross price elasticities of the food classes

Food	Grains	Roots/Tubers	Fruits/ vegetables	Animal protein	Fats/ Oil	Other/ food
Grains	-0.724*** (0.204)	0.371 (0.512)	0.206*** (0.073)	2.458 (1.798)	0.968* (0.582)	1.020 (0.975)
Roots/Tubers	2.0108** (0.544)	-0.182*** (0.050)	0.805 (0.689)	-0.355 (0.548)	-1.040*** (0.305)	2.0309** (1.856)
Fruits/vegetables	1.4807*** (0.620)	1.007 (0.801)	-1.325*** (0.316)	0.268*** (0.065)	2.086** (1.67)	-0.022 (0.130)
Animal protein	2.6556 (1.645)	1.6448* (0.984)	1.660* (0.500)	-1.472*** (0.404)	0.6878 (0.547)	0.6757 (0.456)
Fats/Oil	0.9678*** (0.352)	1.9570 (1.762)	0.062** (0.030)	1.3122 (0.984)	-1.146** (0.562)	2.9879*** (0.635)
Other/food	0.0799 (0.122)	-0.0309 (0.089)	-0.226 (0.175)	0.6757*** (0.253)	0.009 (0.014)	-1.114** (0.523)

Note: ****, **,*, Coefficients are significant at the 1%, 5%, and 10% level, respectively.*
Source: *field survey, 2013*

most parts of rural Nigeria as reported by (Adeyoun *et al.*, 2012). The result of analysis on sex of respondents shows that both males and females are involved in farming in rural areas of Ogun state. This contradicts the findings of Afolabi (2010); Ojiako *et al.,* (2014); Ashagidigbi *et al.*, (2012) and Amao (2013) who observed that male dominance in farming activities may be due to the drudgery nature of agriculture. The observed trend in the study area may however, not be unconnected with the influence of Agricultural Transformation Agenda of the Federal Government of Nigeria whose aim was to reduce the drudgery nature of agriculture and transform it to business; hence, the attraction of more females into agriculture. This may however, play a role in the demand for food by household members as females are known to be more committed to the food intake of all household members compared with males (Amao, 2013).

The results of the analysis of marital status of the sampled respondent indicates that majority of the farming households in rural areas of Ogun state are married. Since married farmers are likely to have a larger family size, their demand for food will be higher than their unmarried counterparts. The result of educational level of the sampled household showed a low level of formal educational attainment. The finding is not in agreement with that of Fashogbon and Oni (2013) who reported that the average years of schooling of rural framers is 7 years. The evidence however, corroborates Adeyonu *et. al* (2012) that reported 5 years as mean year of schooling. This implies that an average rural household head could not read nor write. Generally, there is a low level of education among the farming households living in rural areas and this has implications for their

income-earning capacity as the respondents may lack the required skill to secure a well-paid non-farm job. Also, farmers may find it difficult to adopt improved techniques of production because of their lack of education and may influence their demand for certain classes of food negatively.

Family size in the study area is higher than the recommended national average of four (Alabi and Haruna, 2005). However, Sonaiya (2001) opines that the large family size enables farmers to use family labour most especially when labour-intensive techniques are required. This is in line with the findings of Ashagidigbi *et al* (2012) and Amao (2013), but contradicts that of Fasogbon and Oni (2013) who reported a mean household size of 6.14. the result also shows that farming households in the study area had low contact with extension agents. The implication of the result is agreement with the findings of Otunaiya *et al.* (2012) that states that contact with extension agents, in addition to encouraging farmers to increase their agricultural production, also help to raise their living standard. Hence, the poor standard of living observed in the study area. Most of the rural households were found to have other sources of income. This may not be unconnected with high risks and uncertainties associated with farming which is mostly rain-fed in the study area. The other sources of livelihood may help to minimize consumption shock due to unpredictable income from farming as a result of seasonality in farming activities as well as high risks and uncertainties associated with it (Adeyonu and Oni, 2014).

The results of demand for various food classes by rural farming households presented in table 3 implies that increase in the age and household size will increase the amount spent

on grains compared with others food items whereas, increase in price of grains' own price and animal protein will lead to reduction in the share of grains. The findings concur with those of Fashogbon and Oni (2013). The share of roots and tuber in the household budget share is significant but negatively related with its own price; however, it is positively linked with household size. This implies that the larger an household size the larger the share of expenditure on roots and tubers in the household total budget. This finding agrees with that of Muhammad-Lawal *et al.* (2011) that obtained similar results. Price of fats/oil is the only factor that is related with the share of fruits and vegetables in the rural farming households' total food budget. The price of fats and oil and demand for fruits and vegetable are indirectly related meaning that increase in price of fats and oil will decrease the share of fruits and vegetables in the total household budget. This is in sharp contrast with the findings of Fashogbon and Oni (2013) who reported a direct relationship between the two variables. Price of grains and household size are the two factors which negatively determine the demand for animal protein by rural farming households while household income positively influenced it. The implication is that increase in the price of grains and household size will decrease the demand for animal protein and while increase in household income will lower it. The findings agree with those of Fashogbon and Oni (2013). The share of other food items in the total food budget is positively influenced by age of the respondents and household income meaning that increasing the two variables is capable of increasing the budget share of other food among other food categories.

All expenditure elasticity estimates (Table 4) are **expectedly** positive and significant for broadly defined food aggregates considered in this study; although at different levels of significance. The findings agree with those of Abdullahi (2001); Okoruwa *et al.* (2008); Obayelu *et al.* (2009) and Ashagidigbi *et al.* (2012). Grains, roots/tubers, fruits/vegetables and fats/oil are expenditure inelastic, implying that they are all necessities. This is so because, increase in rural households' total food expenditure leads to less than proportionate increase in their demand. Fashogbon and Oni (2013) obtained similar results for grains and fruits/vegetables. Animal protein and other food are food expenditure elastic and are thus categorised as luxuries. Animal protein and other food have expenditure elasticities of 1.111 and 1.969 respectively. This implies that 100% increase in income will increase the demand for animal protein and other food by about 110 and 197 percent respectively

Expectedly, own price elasticities (Table 5) were all negative thereby, satisfying the negativity property of own price. This indicates that an inverse relationship exists between prices and demand for such food classes. Cross-price elasticities analysis shows that virtually all the food categories are substitutes except roots and tuber group and fats and oil group. This may however, not be unconnected with the low level of education in the study area which makes it difficult for the farming households to appreciate the importance of balanced diet. For healthy living, every meal taking by farmers should contain all the food categories at required proportion. The findings are in line with those of Fashogbon and Oni (2013).

Conclusion

This study examined the determinants of demand for food among rural farming households in Ogun state. Factors influencing the demand for food were analysed using QUAIDS. The results show that differences exist in household expenditure share on various food categories. Food price and income are the main determinants of demand for the various food classes considered in this study. All the food classes have positive expenditure elasticities and negative own-price elasticities. While grains, roots/tubers, fruits/vegetables and fats/oil are expenditure inelastic, animal protein and other food are food expenditure elastic. Virtually all the food classes are substitutes for one another. Policy option that will smooth households' income and ensure stability of food prices should be implemented to ensure adequate demand for nutritious food in the study area.

References

Abdullahi, A. (2001). Household Demand for Food in Switzerland. A Quadratic Almost Ideal Demand System. Department of Agricultural Economics, Swiss Federal Institute of Technology, Sonneggstrasse 33, 8092 Zurich, Switzerland. pp85-92.

Adeyonu, A. G., Oni, O. A, Okoruwa, V. O and Omonona, B. T. (2012). Seasonality in poverty Level of rural farming households in Oyo state, Nigeria. *ARPN Journal of Agricultural and Biological Science* 7(8): 570-575.

Adeyonu, A. G. and Oni, O. A. (2014). Determinants of rural farming households' time allocation: A gender perspective. *Journal of Agricultural Economics and Development* 3(7): 107-119.

Afolabi, J. A. (2010). Analysis of Loan Repayment among Small Scale Farmers in Oyo State, Nigeria. *Journal Social. Science*, 22(2): 115-119.

Ajayi, A. R. and Chukwu, M. O. (2008). Soybean Utilization among Households in Nslia Local Government Area of Enugu State: Implication for the Women in Agriculture. Extension Programme, Department of Agricultural Extension, University of Nigeria Nsukka. Virtual Library, pp 0018-0021.

Alabi, R. A. and Haruna, M. B. (2005). Technical Efficiency of Family Poultry Production in Niger-Delta. *Journal of Central European Agriculture 6(*4): 531-538.

Amao, J.O. (2013). Determinants of Protein Consumption among Households in Ila Local Government Area of Osun State, Nigeria. *Middle-East Journal of Scientific Research* 15(10): 1401-1410.

Aromolaran, A. B. (2001). Research Project On Household Food Security, Poverty Alleviation and Women Focused Development Policies In Nigeria: Final Research Report; African Economic Research Council (AERC), Nairobi, Kenya. pp: 123-136.

Ashagidigbi, W. M., Yusuf, S.A. and Okoruwa, V.O. (2012). Determinants of Households' Food Demand in Nigeria. *World Rural Observ* 4(4):17-28.

Bamiro, O.M (2011). Consumption Analysis of Proteinous Food in Remo Division, Ogun State, Nigeria. *Continental Journal of Agricultural Economics* 5(2):1-7.

Bopape, L. and Myers, R. (2007). Analysis of Household Demand for Food in South Africa: Model Selection, Expenditure Endogeneity, and the Influence of Socio-Demographic Effects. *Selected paper prepared for presentation at the African Econometrics Society Annual Conference, Cape Town, South Africa, July 4-6. 18-25.*

FAO, (2008). Nigeria Monitoring progress towards hunger reduction targets of the World FoodSummit (WFS) and the Millennium Development Goals (MDG). Food and Agriculture Organization of the United Nations. Statistics division Global Statistics Service - Food Security Indicators). 74-81.

Fashogbon, A. E. and Oni, O.A. (2013). Heterogeneity in Rural Household Food Demand and Its Determinants in Ondo State, Nigeria: An Application of Quadratic Almost Ideal Demand System. *Journal of Agricultural Science* 5(2):169-177.

Muhammad-Lawal A, Kolawole, F. L. Balogun , M.A. and Jamiu, A. A. (2011). Food demand Analysis among rural households in Oyo state, Nigeria *International Journal of Food, Agriculture and Veterinary Sciences 1 (1) 45-50.*

National Bureau of Statistics. (1996). *Annual Abstract of Statistics*. Abuja. pp23-25.

NINCID. (1999). *Country Profile-Nigerian National Committee on Irrigation and Drainage*. Federal Ministry of Agriculture & Water Resource, Abuja. pp58-67.

Obayelu A. E. Okoruwa ,V. O. and Oni, O. A. (2009). Analysis of rural and urban households' Food consumption differential in North Central, Nigeria: A Micro-econometric approach. *Journal of Development and Agricultural Economics* 11(2): 8 – 20.

Ojiako, I. A. Idowu, A. O. and Blessing, C. O. (2014). Determinants of Loan Repayment Behaviour of Smallholder Cooperative Farmers in Yewa North Local Government Area of Ogun State, Nigeria: an Application of Tobit Model. *Journal of Economics and Sustainable Development*, 5: 16-23.

Ojo, S. O. (2003). Productivity and Technical Efficiency of Poultry Egg production in Nigeria. *International Journal of Poultry Science, 2*(6): 459-464.

Okoruwa, V. O. and Adebayo, E. A. (2008). Household Food Demand Analysis in AdamawaState, Nigeria. *Global Journal of Agricultural Sciences*, 5(2): 109-115.

Olarinde, I. O. and Kuponiyi, F. A. (2005). Rural Livelihood and Food Consumption Pattern among Households in Nigeria. Implication for food security and poverty eradication in a deregulated economy. *Journal of Social Sciences* 3(11): 127-132.

Olatidoye, O. P. Jimoh, K. O and Adebusuyi, S.M.(2010). Household Food Security Nutritional And Health Status of Pre-School Children from Low Income Household Area of Oyo State Nigeria. *Journal of Agriculture And Veterinary Sciences*, 2(7): 90-100.

Omoteso, O. A. and Muhammad-Lawal, A. (2009).Optimal Food Plan for Rural Households' Food Security in Kwara State, Nigeria: The Goal Programming Approach. *Journals of Agricultural Biotechnology and Sustainable Development*, 2 (1): 7-14.

Otunaiya, A. O., Okuneye, P. A., Aihonsu, J. O. Y (2012). Pattern of Inorganic Fertilizer Use among Food Crop Farmers in Ogun State, Nigeria. Asian Journal of Agriculture, 4(1): 26-31.

Otunaiya, A. O, Okuneye, P. A, Olubanjo, O. O, and Shittu, A. M. (2013). Factor Demand and Inputs Substitution of Inorganic Fertilizer Use in Food Crops Production in Southwestern, Nigeria. *European Journal of Scientific Research* 108 (3):349- 359.

Otunaiya, A. O. and Shittu, A. M. (2014). Complete household demand system of vegetables in Ogun State, Nigeria. *Agricultural Economics (Zemědělská Ekonomika), 60 (11): 509–516.*

Otunaiya, A. O. and Ibidun, O. S. (2014). Determinants of Food security among rural Farming Households in Ogun State, Nigeria. *Journal of Sustainable Development in Africa.* 16 (6): 33-44.

Sonaiya, E. B. (2001). Small Poultry Holdings, the Family and Community Development- Ethology, Ethics and Self Interest. In *Livestock, Community and Environment, Proceedings 10th International Conference of the Association of Institutions of Tropical Veterinary Medicine, AITVM,* Copenhagen, Denmark pp. 20-23.