DETERMINANTS OF FOOD SECURITY STATUS OF SMALLHOLDER FARMING HOUSEHOLDS IN MBAITOLI LOCAL GOVERNMENT AREA OF IMO STATE, NIGERIA

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ABSTRACT
The study analyzed the determinants of food security status among smallholder farming households in Mbaitoli Local Government Area (LGA) of Imo State, Nigeria. The Multi-stage sampling technique was used to select 90 smallholder farmers for the study. Primary data were collected from the respondents through the use of a well structured questionnaire. Data were analyzed using descriptive statistics, Food security Index and the Logit regression model. Results showed that majority (63%) of them were male, majority (72%) of the household heads were married with a mean age of 49 years and they had an average household size of 6 persons, while majority (52%) of them had also attained primary education with mean farming experience of 10years. Based on the recommended daily calorie intake (R) of 2,470kcal, the result showed that majority (61.4%) of the farming households were able to meet the recommended calorie intake, while (38.6%) of the farming households did not meet up with the recommended calorie intake. The result portrays that the smallholder farming households in the study area are food secure, since the proportion of food secured households is greater than the proportion of food insecure households. The surplus index and shortfall index were 0.2750 and 0.1828 respectively. The logit regression analysis revealed that access to credit, educational attainment and household size were the determinants of food security status of the farming households although the coefficient for household size had a negative effect on the food security status of farm households. The study recommended that Government, Non-governmental organizations and Stakeholders should support farmers by formulating and implementing sustainable policies that will stimulate improved food production technologies and that farming households should also be properly educated on the need for family planning in order to enhance and sustain their food security status.
KEYWORDS: Food security, Food security index, Logit regression, Farming Households

INTRODUCTION

Agriculture accounts for over 70% of the non-oil exports and, perhaps most importantly, provides over 80% of the food needs of the country Adebgboye (2004). Despite the huge potentials of Nigerian agricultural economy, most of the Nigerian population can't meet their daily food requirements FAO (1996), Orewa and Iyambe (2009). The number of food-insecure people is projected to be more than double in ten years, from 17 million in 2012 to 43 million in 2022 (Federal Ministry of budget and Planning, 2016) The major problem is that the agricultural sector has remained underdeveloped and of utmost concern are the exacerbating factors to these issues which include inconsistent agricultural policies that have been poorly executed, poor funding of the agricultural sector, conflicts of herdsmen and farmers, climate change risks and infrastructural decay in the country, all these among others have worsened the problem of food insecurity and poverty level in Nigeria. Sequel to this, the increase in population at a rate considerably higher than the rate of increase in food production has continued to widen the gap between domestic food supply and domestic demand, thus this disparity has led to rising food prices and declining foreign exchange earnings from agricultural exports. The interaction of these factors has also led to food insecurity which is a growing concern throughout the developing world and the idea of attaining self sufficiency in food crop production is becoming more difficult due to declining agricultural production and widespread poverty.

Food security is said to exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to maintain a healthy and active life FAO (2004), However, the definition adopted by the countries attending the world food summit of 1996, and reconfirmed in 2002, accepts the USAID's concept which has three key elements; food availability, food accessibility and food utilization. Firstly, food must be available in sufficient quantities, continuously and consistently. The concept of food availability implies self-sufficiency of a household, of the community and of the nation as a whole. Secondly, the concept of food accessibility implies that people must be able to regularly acquire food, through home and local production or importation. Hence, household food access is the ability to obtain sufficient food of guaranteed quality and quantity to meet nutritional requirements of all household members. Lastly, there must be absolute utilization of available food and also it must be accessible to farm households.

Thus, a farm household is considered food secure when its occupants do not live in hunger or fear of starvation (FAO, 2001). Consequently, absence of

food security is food insecurity; Food insecurity exists whenever the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain and when individuals cannot provide enough food for their families, it leads to hunger and poor health. According to Cruz (2010) and Valdés et al., (2010), majority of the smallholder farmers in the world are food insecure and depend on land as their primary source of livelihoods. Studies by (Nweze and Gloria, 2013; Out et al., 2014) have identified low agricultural productivity among others as responsible for food shortage and insecurity among farm households. Similarly, the changing climatic pattern and over reliance on rain fed agriculture pose a serious food security challenge in rural areas. Other associated threats to food security include; inconsistent government policies, gender inequality, poor extension services, crude agricultural practices, poverty, illiteracy, population increase, corruption, political instability, extreme weather conditions, pests and livestock diseases, and environmental issues such as erosion, flood, drought, desertification, etc these impacts negatively on food crop production thereby leading to food reduction (Nweze and Gloria, 2013; Olajide, 2014). Various governments have intervened in the agricultural sectors through the establishment of various programs and schemes aimed at ameliorating the plight of small holder farmers and thereby enhancing their productivity and food security status. Thus, it becomes imperative to determine the food security status of these rural smallholder farmers and analyze the determinants of their food security status in the study area.

MATERIALS AND METHODS

The study was conducted in Mbaitoli Local Government Area in Imo State, Nigeria. The study area has an area of 204km^2 and a population of 237,555 as at the National Population Commission (NPC) 2006 census. Mbaitoli Local Government Area shares common boundaries with Oru, Njaba, Isu Local Government Areas in the North while its Southern boundary is with Owerri North and Owerri West Local Government Areas. The L.G.A. is divided into 9 autonomous communities which are, Ifakala, Mbieri, Ubomiri, Ogbaku, Eziama-Obiato, Umunoha, Orodo, Afara and Ogwa with 12 INEC wards. The inhabitants of the area are predominantly farmers who produce a variety of food and cash crops such as Yam, Cocoyams, Cassava, Maize, Vegetable and Palm produce. Rearing of animals and poultry are also common in the area. The also engage in crafts such as basket making, broom making, hair weaving etc.

Sampling Technique and Data Collection

The Multistage sampling technique was adopted in the selection of the sample size. In the first stage, 5 autonomous communities were randomly selected out of the 9 autonomous communities in Mbaitoli Local Government Area. In the second stage, 2 villages were also randomly selected from each of the sampled communities thereby giving a total of 10 villages. From the sampling frame which is the list of the total number of registered farming households in the area compiled with the assistance of the extension agent in the area, 9 farming households were randomly selected from each village thereby giving a sample size of 90 smallholder farming households . Data were collected from Primary and secondary sources. Primary data were collected with the aid of a structured questionnaire. The secondary sources of information were from journals, bulletins, conference proceedings and internet. In order to realize the objectives of the study, Descriptive statistics, Food security index and the Logit regression model were employed. Food security index as adopted by Babatunde et al., (2007) and John et al. (2013) was used to analyze the food security status of the farming households based on the food security line. The FAO (2010) recommended minimum daily energy requirement per adult equivalent is 2470kcal; therefore this value defines the food security line for the study. Households which are below the food security line are classified as food-insecure households while those households that are equal or above the food security line are classified as food-secured households.

The Food Security Index is given

$$FSI = \frac{HD}{RD} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (i)$$

Where FSI = Food security index

HD = Households daily per capita calorie intake

RD = Recommended daily per capita calorie requirement

Households' calorie content was estimated using food nutrient composition table of commonly eaten foods in Nigeria which was converted into kilogram. The energy content of 1kg of each foodstuff (maize, cassava, rice, yam, plantain, etc) was used in this study. Furthermore, food insecurity gap index (FIG), food surplus gap index (FSG) and the headcount ratio (HCR) were calculated for the sampled farming households based on the food security index. The food insecurity gap measures the extent to which food insecure households on average fall below the food security line and the food surplus gap measures the extent to which food secured households are above the poverty line.

Where;

M = number of food insecure households;

N = total number of households in the sample;

L = number of food secure households;

Gi = daily per capita calorie deficiency or surplus for ith household;

Hfs = headcount index for food secure households;

Hfi = headcount index for food insecure households;

Yi = daily per capita calorie consumption on food item of ith households;

R= recommended daily per capita calorie requirement. The headcount index measures the percentage of sampled household that are food insecure/secure. The head count ratio, food insecurity gap, and food surplus gap as adopted by (Out et al., 2014) are defined as follows;

$$Headcount\ Index\ (Hfi) = \frac{M}{N} \ldots\ldots\ldots\ldots\ldots\ldots (ii)$$

$$Headcount\ Index\ (Hfs) = \frac{L}{N} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (iii)$$

$$Food\ insecurity\ gap\ index\ (FIG) = \frac{1}{M}\sum_{i=1}^{m} Gi\ where\ Gi = \frac{Yi - R}{R} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (iv)$$

$$Food\ surplus\ gap\ index\ (FSG) = \frac{1}{L}\sum_{i=1}^{l} Gi\ where\ Gi = \frac{Yi - R}{R} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (v)$$

The Logit analysis was employed to analyse the determinants of food security in the study area. Adopting the model as used by Rahji (2007), the model postulates that the probability (P*i*) that a household *i* will be food secure is a function of an index Z*i*, that is;

$$Pi(y = 1) = f(Zi) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (vi)$$

The probability of being food secure is given by

$$Pi(y = 1) = \frac{1}{1+e^{-Z_i}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (vii)$$

The probability of being food insecure is given by

$$1 - Pi(y = 1) = \frac{1}{1 + e^{-Z}i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (viii)$$

$$e^{Zi} = \frac{Pi(y = 1)}{1 - Pi(y = 1)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (ix)$$

$$loge\frac{Pi(y = 1)}{1 - Pi(y = 1)} = Zi \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (x)$$

The dependent variable (yi) is a dummy and it takes the value of 1 if the household is food secure and 0 if otherwise. The logistic regression is expressed as;

$Z_i = b_0 + b_1X_1 + b_2X_2 \ldots\ldots\ldots\ldots\ldots + b_nX_n \ldots\ldots\ldots\ldots\ldots (xi)$

Where;

b_0= constant
$b_1 – b_8$ = coefficients of explanatory variable
X_1= educational attainment (number of years spent in school)
X_2= farm size (hectares)
X_3= household size (number)
X_4= farming experience (number of years)
X_5= access to credit (1 = yes; 0 = no)
X_6= use of improved varieties (1 = yes; 0 = no)
X_7= farm income (₦)
X_8= cooperative membership (1 =yes; 0 = no).
ε= stochastic error term

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents in the Area

Table 1 shows that the mean age of the household farmers' was 49 years, which implies that the farmers are within their economic active age bracket and that they are able to cultivate large size farms for increased food production and engage in off–farm jobs so as to increase household income, Majority (63%) of the farm household heads are male and according to Ziervogel et. al., (2006) men have easier access to farmland and inherited property through paternal inheritance than women in Nigeria, based on this, male headed households are expected to have more access to farmland for food crop production. Majority (72%) of them are married and the mean household size in the area was 6, which implied that there will be enough manpower for food crop production instead of using hired labourers. The mean educational attainment of the farmers was 10 years which implies that the heads of the various farming household were relatively educated to embrace and adopt innovative technologies in their farming enterprises, while the mean farming experience of the farm households was 10 years and this implies that the heads of the various farming household are well experienced to increase their output and secure enough food for family consumption, as farming experience helps in better resource combination for increased productivity and food security.

Table 1 Distribution of the Respondents according to their Socio-economic characteristics

Variable	Frequency	Percentage
Gender		
Male	57	63.3
Female	33	36.7
Age		
≥ 30	4	4.4
31 – 40	13	14.4
41 – 50	34	37.80
51 – 60	14	15.6
60 years and above	25	27.8
Mean	49	
Marital Status		

Married	65	72.23
Single	18	20.00
Widow	7	7.77
Educational attainment (years)		
No formal education	17	18.9
Primary education	47	52.20
Secondary education	20	22.20
Tertiary education	6	6.70
Farming Experience (years)		
0 – 4	8	8.9
5 – 9	41	45.6
10 – 14	26	28.9
14 and above	15	16.7
Mean	10	
Household size		
1– 3	17	18.90
4 – 6	39	43.33
7 – 9	22	24.44
10 and above	12	13.33
Mean	6	

Source; Field Survey (2019)

Food Security Status of Farming Households in Mbaitoli Local Government Area

Table 2 shows the Food security status of farming households in the study area and based on the recommended daily calorie intake (R) of 2470kcal, the study revealed that 61.4% of the farming households were food secure while 38.6% of them were food insecure. This result further portrays that the study area is food secure since the number of food secure farming households (61) is greater than the number of food insecure farming households (39). This finding is consistent with that of Ifeoma and Agwu (2014) who reported that 74.2% of farming households in the study area were food secure while 25.8% of the farming households were food insecure. Also based on the food security index (Z) of the farming households, the study revealed that the Head count ratio (H) for the food secure households was 0.61, indicating that 61% of the farming households were food secure, while for the food insecure households, the Head count ratio (H) was 0.37, also indicating that 37% of the farming households were food insecure. The absolute value of the surplus index (P_{sp}) for the food secure farming households was 0.2750 while the absolute value of the shortfall index (P_{sf}) was -0.1828. The surplus index of 0.2750, implies that the food secure farming households were in excess of their daily requirements by about 28%, while the shortfall index of -0.1828, implies that the food insecure farming households fell short of their daily recommended calorie intake by about 18%.

Table 2: Food Security Status of Farming Households in Mbaitoli Local Government Area

Food Security Indices	Food Secure	Food Insecure	Total
Number of Households	55	35	90
Percentage	61.4	38.6	100
Head count ratio	0.61	0.37	-
Surplus/ Shortfall index	0.2750	-0.1828	-

Source; Field Survey (2019)

Determinants of Food Security Status of Farming Households in the Study Area

Table 3 shows the determinants of farming household's food security status in the study area. The significant variables were educational attainment, household size and access to credit. Educational attainment of the farming household was positive and had a significant relationship with food security at 10% level of significance, which implied that the probability of food security increases with increase in the level of educational attainment, this finding is consistent with that of Obasan, et.al (2017), Ayantoye, et.al (2011) and Oni et,al (2011). The result of the marginal effect implies that a unit increase in educational attainment of household head would increase the probability of being food secure by 0.0420. Also, the study revealed that household size had a negative and significant influence on the food security status of the farming households at 1% level of significance, which implied that the probability of food security decreases with increase in the household size. The marginal effect of this result implies that, a unit increase in the household size would decrease the probability of being food

secure by -4.2780. This is expected because, an increase in household size especially the non-working members put pressure on consumption than production and thus increases food insecurity level of households (Babatunde et al., 2007; Ojogbo, 2010). The study further revealed that the coefficient of access to credit was positive and had a significant influence on the food security status of the farming households at 5% level of significance, which implied that the more access the farmer has to credit, the more food secure he will be. Access to credits will enable farm households to acquire more hectares of farmland, acquire productive resources, adopt improved technologies and use improved varieties. This will enhance productivity and income of farmers and it will ultimately impact positively on food security level of households. The marginal effect of this result implies that, a unit increase in the ability of the household head to access credit facilities would increase the probability of being food secure by 1.9515. This is consistent with the findings of Henri-Ukoha et.al (2013)

Table 3 Determinants of Food Security Status of Farming Households in the study Area

Explanatory variables	Coefficients	T-ratio	Marginal effect
Intercept	5.5069***	2.2492	5.9970
Educational attainment	0.1222*	0.1029	0.0420
Farm size	0.1638	0.6227	0.0692
Household size	-0.4682***	-0.2264	-4.2780
Farming experience	0.2273	0.0738	0.0947
Access to credit	1.8156**	1.3001	1.9515
Use of improved varieties	0.3005	0.5854	0.2635
Farm Income	-0.5986	1.2426	0.2321
Cooperative membership	-0.3039	0.9754	0.0971

Source: Field survey data 2019
Pseudo (R^2) =0.78322
Log-likelihood function =-133.15
***,**, * significant at 1%, 5% and 10% respectively

CONCLUSION AND RECOMMENDATION

The findings of the study showed that 61.4% of the farming households were able to meet the recommended calorie intake of 2470kcal per capita per day, while 38.6% of the farming households were not able to meet the recommended calorie intake. The food surplus/shortfall gap index which measures the extent of deviation from the food security line shows that food secure households exceeded the recommended daily calorie requirement by 27.5%, while the food insecure households fell short of the recommended calorie requirement by 18%. Educational attainment, household size and access to credit were the determinants of food security status of the farming households in the study area. To this end, Government, Non-governmental organizations and Stakeholders should support farmers by creating enabling environment for farmers to embrace improved food production technologies and that farming households should be properly educated on the need for family planning and birth control in order to enhance their food security status.

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