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Full Length Research Paper

Household level food security status and its determinants among rural farmers in Akwa Ibom State, Nigeria

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Abstract

Despite the increase in food availability world-wide, majority of the rural population are still food insecure. Empirical evidence abound that food insecurity has a life-long detrimental impacts on productivity and income generating potential of populations. This study aims to analyze the food security status of rural farm households in Akwa Ibom State, Nigeria. A multistage sampling procedure was employed to select 343 food crop farmers in the area. Primary data were obtained through survey and were analyzed using descriptive statistics, food security index and binary logistic regression model. The results showed that about 78% of the respondents were married, with mean household size of 6 persons. Most (58%) of the respondents were male, with mean educational level of 11 years. About 91% applied fertilizer, while 60% adopted soil conservation practices. The results further indicated that educational level (p> 0.10), marital status (p>0.05), use of fertilizer (p>0.10) and adoption of soil conservation practices (p>0.10) positively influenced the odd of the households being food secure, while household size (p>0.05) and dependency ratio negatively influenced to the odd of the household being food secure. The study proffered some policy options such as educating members of the household through seminars and workshops, making available fertilizer to farmers at a subsidized rate, controlling birth rate, disseminating of information to farmers related to soil conservation practices, are required to reduce food insecurity problems in the area.

Keyword: food security, rural farmers, logit, Nigeria.

Introduction

Securing already produced food is one of the most pressing current issues in the world today. World Bank (2006), defined food security as a situation that all people at all times have access to sufficient, safe, and nutritious food to maintain a healthy and active life. Food insecurity has presented a huge challenge to all levels of governments in developing nations as extant literature reported increasing growth of hunger, especially in most rural areas. According to Food and Agriculture Organization there are about 11 million undernourished people in developing countries (FAO, 2015) and this has cause a high burden of malnutrition and its consequences in these regions. It may jeopardize the achievement of the Sustainable Development Goals (SDGs) aim to end hunger, achieve food security and improve nutrition and promote sustainable agriculture by year 2030. In addition, Mutisya, Kandala, Ngware and Kabiru (2015), articulate food security as a human right, which need urgent attention. Despite this recognition, millions of people in sub-Saharan Africa and Nigeria in particular suffer from extreme hunger and malnutrition. However, sub-Saharan Africa faces the most severe challenges in securing its food condition mainly due to sluggish income growth, high poverty rates and poor infrastructure, which hampers

physical and distributional access (FAO, 2016). In addition, sub-Saharan Africa is a region with lowest agricultural productivity and vulnerability to climate change is high, and by 2030, population growth, and hence food demand, is projected to increase the most in the region.

Food security is indispensable prerequisite for the survival of mankind and its economic activities including production of crops and animals. Household food insecurity is associated with poor nutritional health (Cook, Frank, Berkowitz, Black, Cassey and Cutt, 2004; Cook and Frank, 2008). World Bank (2016) reported that about two thirds of the poor in sub-Saharan Africa's Low Income Countries (LIC) live in rural households, of which agriculture is the dominant source of livelihood. This implies that agriculture plays a key role in the provision of food security and income. Increasing growth of agricultural output is central to boosting income in these countries. This requires significant public investment in rural public goods to strengthened markets and promotes the adoption of new technologies (World Bank, 2016). In general, food security is defined as a condition "when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life" (FAO 2015). This means that food security includes freedom from both famine and chronic malnutrition. Also, about 795 million people are estimated to be undernourished globally (FAO, IFAD, WFP, 2015). Bonnard (1999) identified food security to incorporate four major elements namely, food availability, food accessibility, utilization and stability of food access. The author reiterate that food security is a complex phenomenon attributable to many factors that vary in importance across geographic and social boundaries and the concept is multi-dimensional, providing valuable insights into the nature and extent of a population's food situation. Also Gahukar, (2011) observed that security is best assured when food is locally produced and made available on a continuous basis at an affordable price (maximizing stability in flow of supplies), regardless of climate and other variations. But most farmers in rural areas of developing nations lack the capacity to produce food, making them vulnerable to food insecurity situations. World Bank defined food insecurity as 'the lack of capability to produce food and to provide access to all people at all times to enough food for an active and healthy life'' (World Bank, 2006).

Available literatures, suggests that food security is associated with a number of human and economic development outcomes (FAO, WFP & IFAD, 2012; Cook and Frank, 2008), which is very much linked with increased agricultural production, management of natural resources, environmental protection, and trade policies. In Nigeria, food security is rising to the center of national discourse as well as public concern, largely because Nigeria was self sufficient in food production and was indeed a net exporter of food to other regions of the continent in the 1950s and 1960s. Due to oil boom, many farmers left agriculture for industries, and this caused a slow growth in the sector (Okon and Enete, 2009). These however, has resulted in growing food imports and food insecurity in the country, this is so because most of the hungry people in the country live in rural areas, depending on agriculture as their major source of livelihood. It is imperative to develop agricultural growth, as it could eradicate extreme poverty and hunger and hence, food insecurity. Given the foreign exchange shortages in the country, coupled with intermittent power outages, which weigh heavily on the manufacturing sector, reflecting the broad weakness in the economy, Nigeria's GDP contracted by 1.7 percent in 2016 and also, per capita growth was negative in the same period. The unemployment rate in Nigeria reached 13.9 percent in the third quarter of 2016, from 10.4 percent in the fourth quarter of 2015 (World Bank, 2017). Additionally, the United Nations (UN) 2017 report on common country assessment stated that "*Nigeria is one of the poorest and most unequal countries in the world, with over 80 million or 64 per cent of her population living below poverty line. Poverty and hunger have remained high in rural areas, remote communities and among female-headed households and these cut across the six geo-political zones*" (United Nations, 2017).

Despite the Nigeria's enormous resource, the huge financial investment in Agricultural sector and more than 56 years of independence, many Nigerians cannot afford three square meals a day. About 37 per cent of children under five years old were stunted and 29 per cent underweight due to malnutrition in 2016. Nigeria's economy is currently in a recession and it is estimated that government revenues have fallen by as much as 33 per cent, which has further resulted in the contraction of the Gross Domestic Product (GDP) by 0.36 per cent in the first three months of 2016 (World Bank, 2017). Also, there is a huge demand-supply gap of food production in Nigeria, and this could be attributed to low productivity in agriculture leading to high food imports.

Approximately 3.1 billion people, or 45 percent of the global population, live in rural areas, of which about 2.5 billion depend on agriculture as their principal means of subsistence (UNDP, 2012). Therefore it is essential that significant increases in agricultural productivity be supported and achieved at household level (World Bank, 2017), and this can only be achieved if the factors that determined food security status of farm households are empirically determined. To date household level research on food insecurity challenges in Akwa Ibom State is limited. This study which analyzes the factors that influence the food security status of rural farmers in Akwa Ibom State, Nigeria will not only add to the topical issue of food security but will be of immense use to policy makers.

Materials and methods

Study area

The study was conducted in Akwa Ibom State in Nigeria, with a projected population of about 5.451 million (NBS, 2016). The state is a major oil-producing area and is located in the South-South geo-political zone of the

country, lying between latitudes 4°32' and 5°33' N and longitude 7°25' and 8°25' E. It shares its southern boundary with the Atlantic Ocean, eastern boundary by Cross River State and western and northern boundaries by Rivers and Abia States, respectively. The State presently comprises 31 Local Government Areas, and has two distinct seasons; the wet and dry seasons. The State though predominantly depending on rain-fed agriculture, has a very rich potential for agriculture, and is suitable for food and tree crops, fish and livestock farming. The typical cropping system in the State is root and tubers based cropping system. Crops widely grown in the area are leafy vegetables such as waterleaf, fluted pumpkin and garden egg. Others include cassava, maize, yam, pepper, plantain and cucumber. Some households grow cash crops such as oil palm, rubber and cocoa. The State comprises six agricultural zones, namely: Abak, Eket, Etinan, Ikot-Ekpene, Oron and, Uyo, with agriculture being the main local employer.

Sampling Procedure and Sampling Size

Data for the study were obtained from primary sources using structured questionnaire administered to farm households. Multistage random sampling technique was employed in this study. In the first stage, one Local Government Area was randomly selected from each of the six agricultural zones, which include; Abak, Eket, Etinan, Ikot- Ekpene, Oron and Uyo. In the second stage, six communities were randomly selected from each of the selected Local Government Areas, giving a total of 36 communities. In the third stage, 10 households were randomly selected from each of the communities, giving a total of 360 farm households (60 from each zone). However, due to inconsistency in data from some farm households, some copies of the questionnaires were rejected. The analysis was therefore based on information from a total of 343 households (80 each from Uyo, Eket and Ikot-Ekpene zones, and 40 each from Abak and Etinan zones, and 23 from Oron zone). Variations in the administration of the questionnaires were according to population in each zone. Data collection took place in 2015.

Data Analysis

Data were analyzed using descriptive statistics, food security index estimation and logistic regression analysis. Food security index estimation was done using household expenditure method as proposed by Omonona & Agoi (2007). This method was employed to classify the respondents into food secure and food insecure households in a bid to establishing the food security status of the individual households. The formula is given as:

$$Fi = \frac{\text{Per capita monthly food expenditure for the ith household}}{\text{2/3 means per capita monthly food expenditure of all households}}$$

Where Fi = Food security index. When Fi ≥ 1 it implies that the ith household is food secure, but when Fi < 1, it implies that the ith household is food insecure. A food secure household is, therefore, that whose per capita monthly food expenditure is at least two-third of the mean per capita monthly food expenditure. On the other hand, a food insecure household is that whose per capita monthly food expenditure is less than two-third of the mean monthly per capita food expenditure. In addition, the binary logistic regression was used to determine the effects of some socioeconomic characteristics of the households on their food security status. The logistic regression then provides a model of observing the probability of a household becoming food secure or food insecure. The logistic model is specified explicitly as:

Binary logistic regression model

A binary response function (food secure and food insecure) was specified and estimated by the logistic procedure. The binary logistic specification is suited to models where the endogenous variable is dichotomous, which in this case are the households who are food secure and those who are food insecure. The binary Logit model has been widely used in order to explore the determinants of food security in many studies for example Bayene & Muche (2010), Arene & Anyaeji (2010). In order to facilitate analysis of the data, a value of 1.00 was assigned to the farm households who are food secure and 0.00 to those who are food insecure. The parameter of the logistic regression model was estimated with the Maximum Likelihood Estimation (MLE) technique. The logit specification then provides a model of observing the probability of a household being food secure. The model is

specified explicitly as follows:

$$Yi = \beta o + \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3 + \beta_4 \chi_4 + \beta_5 \chi_5 + \beta_6 \chi_6 + \beta_7 \chi_7 + \beta_8 \chi_8 + \beta_9 \chi_9 + \beta_{10} \chi_{10} + \varepsilon \quad \ldots (1)$$

Where Yi = Food security status

β_0 = intercept

βi = the coefficients

$\varepsilon =$ error term

X_1 (EDUHH) = Level of Educational attainment (Years)

X_2 (AGEHH) = Age of the household head (Years)

X_3 (MSTHH) = Marital Status (Dummy, takes the value 1 if married and 0 otherwise)

X_4 (FAINCOME) = farm income of the household head (measured in Naira)

X_5 (HHSIZE) = Household size (number of persons living in the household)

X_6 (FAMSIZE) = Total area of farm land owned by the household (measured in hectares)

X_7 (GENHH) = Gender of the household head (Dummy, takes the value 1 if male and 0, otherwise)

X_8 (FERTUSE) = Fertilizer use (Dummy, takes the value 1 household used fertilizer in the last five years and 0 otherwise)

X_9(SCONPRACT) = Soil conservation practices

X_{10} (DEPRAT) = Dependency ratio, obtained by dividing inactive labor force (age less than 15 and above 65) by the active labor force (age between 15 and 65) with in a household.

Results and Discussion

Table 1 shows the socio- economic characteristics of the respondents. The Table showed that majority (67 %) of the respondents were within the age bracket of 31-50 years, with a mean age of about 44years. This implies that the respondents were very energetic and in their active and productive age. This could boost high agricultural productivity (if all their efforts were channeled into agriculture). Analysis of gender distribution of the households showed that most (58 %) of the respondents were males, while 42 % were females, an indication that males dominates the area. About 78% of them were married, while about 22% of them were single. Only about 2% of the respondents had no formal education, about 26 of them had primary education, while about 37% and 35% of them had secondary and tertiary education, respectively. The mean household size was about 6 persons. This is above the recommended household size of 5 persons in Nigeria. The mean farm size was 1.07, an indication that they were basically small scale farmers. Majority (91%) of the respondents agreed to using fertilizer in their farm to boost food production, while about 9% of them didn't use any form of fertilizer. Also, about 60% of them practiced different soil conservation techniques, while 40 % of the respondents didn't practice soil conservation techniques.

Table 1: Socio-economic Characteristics of the respondents

Variables	Frequency	Percentages
Age (years)		
≤ 30	39	11.37
31-40	82	23.91
41-50	147	42.86
51-60	69	20.11
Above 60	6	1.75 Mean 44.38
Total	343	100
Gender		
Male	200	58.31
Female	143	41
Total	343	100
Educational Status		
No formal	7	2.04
Primary Education	89	25.95
Secondary Education	128	37.32
Tertiary Education	119	34.69 mean= 11.41
Total	343	100
Marital Status		
Single	74	21.57
Couple	269	78.43
Total	343	100
Household Size		
1-4	90	26.24
5-8	228	66.47
9-12	24	7
Above 12	1	0.29 mean = 5.68
Total	343	100
Farm size (ha)		
≤ 0.50	32	9.33
0.51-1.0	133	38.77
1.1-1.5	73	21.28
1.51-2.0	50	14.58
Above 2.0	55	16.04
Total	343	100
Fertilizer use		
Yes	312	90.96
No	31	9.04
Total	343	100
Soil Conservation Practices		
Yes	205	59.77
No	138	40.23
Total	343	100

Source: field survey, 2015

Food Security index analysis

The result of the food security index analysis is presented in Table 2. In Table 2, the food security status of the households was evaluated using their mean per capita expenditure on food phased in deciles (Arene and Anyaeji, 2010). The Table showed that the 2/3 MPFCE of the respondents was ₦ 91,795.15. Any household whose MPFCE was less than ₦ 91,795.15 was classified as food insecure while those households whose MPFCE was equal to or greater than ₦ 91,795.15 was classified as food secure.

Table 2: Food Security line for households

First	19,695.13
Second	39,274.2
Third	22,058.83
Fourth	23,402.78
Fifth	19,116.68
Sixth	14,095.73
Total	137,693.35

Source: field survey, 2015 2/3 MPCFE =₦ 91,795. N/B ₦385 = 1 US Dollar

Table 3: Food security Status of the respondents

Food security status	Frequency	Percentage
Food secure	161	46.94
Food insecure	182	53.06
Total	343	100

Field Survey, 2015

Table 3 showed that more than half of the respondents (53%) were food insecure since their monthly per capita food expenditure falls below two third (2/3) of the mean monthly per capita food expenditure. Also, the incidence of food insecurity as calculated by the head count ratio was found to be 0.53. This is an indication that majority of the households in the area were food insecure.

Logistic regression estimates of the determinants of food security among rural farm households in Akwa Ibom State

The logistic regression model was used to identify the determinants of food security. The overall logistic model was significant (P< 0.01) based on the chi square estimates, thus implying that the explanatory variables are relevant in determining the household food security in the area. Also, coefficient of determination, R^2, was found to be 80 percent implying that the variation in food security status is due to the stated socio-economic characteristics of the respondents. Out of the 10 explanatory variables fitted into the model, six of them were found to be statistically significant, these are: educational level of the household head, marital status, household size, use of chemical fertilizer, soil conservation practices and dependency ratio. Educational level of the household head, had a positive and statistically significant (P<0.10) relationship with household food security. The marginal effect indicates that a one year increase in educational level of the household head will increase the likelihood of a household being food secure by 0.001. The odd ratio also suggests that, a year increase in educational level will increase the odd of a household being food secure by 1.33347 times. The possible explanation to this is that literate household heads employed new innovations and/or adopted new technologies in their farms, and these improved productivity thereby making the household food secure. In collaboration, Mango, Zamasiya, Makate, Nyikahadzoil and Siziba (2014) observed that household heads with high level of education, could build capacity to enhance food security. This is true because the more the household head is educated, the higher the probability of educating family members to be familiar with new innovations (Gebre, 2012).

Marital status of the household heads had a positive and statistically significant (P<0.05) relationship with food security. This could mean that couples in the area were more likely to be food secure than single households, basically because couples put their resources together which could generate more income than their counterpart, hence making them food secure. Also, the marginal effects suggest that a unit increase in the number of couples in the area, could increase the number of food secure households by 1.5, while the odd ratio showed that the likelihood of the household being food secure increases by 141.0379 times for married couple. The coefficient of farm income was positive but not statistically significant.

The coefficient of household size was negative and statistically significant (P< 0.05). The marginal effect showed that a unit increase in the number of persons (or a dependent adult member) in the household will decrease the likelihood of a household being food secure by 0.02, while the odd ratio indicates that increasing the household size (especially for dependent members) will increase the likelihood of a household being food insecure by 0.4652291 times. This is to be expected because a household with large size, composed mainly of non-

productive members is more likely to be food insecure due to high per caput food burden on active labor (Bigsten, Kebede, Shimelis and Taddesse, 2002). Farm size had a positive relationship with food security and the coefficient of gender of the household head had a negative relationship with food security, but both were not statistically significant.

The coefficient of use of fertilizer had a positive and statistically significant (P<0.10) relationship with food security. The marginal effect indicates that a unit increase in the number of households applying fertilizer will increase the likelihood of the households being food secure by 0.06. Also, the odd ratio showed that farming households that applied fertilizer are 25.0809 times more likely to be food secure in comparison with those that did not apply fertilizer. A plausible explanation to this result is that households using fertilizer on their farms produced more for household consumption and for sale, thereby having more chance to be food secure than their counterpart that did not apply fertilizer.

The variable, soil conservation practices had a positive and statistically significant (P<0.10) relationship with food security. The marginal effect indicated that a unit increase in the number of households adopting soil conservation measures will increase the number of food secure households in the area by 0.2, while the odd ratio further showed that a unit increase in the number of households adopting soil conservation practices will increase the number of households that are food secure by 17.6473 times. This is particularly important because in some parts of the State, soil degradation is a constraint to food production, mainly because unsustainable soil practices, upon which agriculture depends, considerably affects food security (Amusa, Enete and Okon, 2015).

The coefficient of dependency ratio was negative and statistically significantly (P<0.05) related to the probability of a household being food secure. The marginal effect showed that a unit increase in the number of dependent members will increase the number of food insecure households by 0.06. Similarly, the odd ratio showed that a 1% increase in the number of dependent members in the area will increase the number of food insecure households by 0.11913 times. This implies that household with more dependent population are more likely to be food insecure. This result is in collaboration with the findings of Bigsten et al., (2002).

Table 4: Parameter estimates of determinants of food security among rural farm households in Akwa Ibom State

Explanatory variables	Coefficient/ Standard error	Z- values	Marginal effects	Odd ratios
EDUHH	0.287784	1.77*	0.00009	1.33347
	(0.162582)		(0.00016)	
AGEHH	-0.103235	-1.39	-0.00003	0.90192
	(0.074145)		(0.0006)	
MSTHH	4.949028	2.09**	0.015076[a]	141.0379
	(2.71704)		(0.02123)	
OFFINCOME	1.15e-06	0.11	3.64e-10	1.00001
	(0.000010)		(0.0000)	
HHSIZE	-0.765224	-2.43**	-0.000243	0.46523
	(0.314815)		(0.0005)	
FAMSIZE	1.08886	0.63	0.000346	2.97089
	(1.724654)		(0.0081)	
SEX	-0.365452	-0.26	-0.000113 [a]	0.69389
	(1.379151)		(0.00046)	
FERTUSE	3.22211	1.79*	0.005688 [a]	25.0809
	(1.79906)		(0.01283)	
SCONPRACT	2.870583	1.69*	0.001665 [a]	17.6473
	(1.69705)		(0.00277)	
DEPRAT	-2.12757	-2.00**	-0.000676	0.11913
	(1.065629)		(0.00127)	

Log Likelihood ratio = -12.70359
LR Chi^2 = 103.92
Pseudo R^2 = 0.8035
Number of observations = 343
** = Significant at 5 % level of Probability
* = Significant at 10 % level of Probability
([a]) dy/dx is for discrete change of dummy variable from 0 to 1.

Source: Calculations from field survey data, 2015, figures in parenthesis are standard errors.

Conclusion and Policy implications

The study assessed the socio- economic factors and the determinants of food security status among rural farming households in Akwa Ibom State, Nigeria. The result showed that about 67% of the household heads were less than 51 years, with a mean age of 44 years. About 58% of the households were headed by men, while 78% of them were married. The average household size was approximately 6 person and about 67% of the households have more than 5 persons per household. The mean educational level was about 11 years with about 35%

having tertiary education. The head count ratio (showing the proportion of household that was food insecure) was 0.53. It further showed that food insecurity was lower among household heads with higher educational attainment and among married couple who used fertilizer and soil conservation practices in their farm land. Conversely, food insecurity increases with increase in household size and dependency ratio among the rural households in the area.

Policy Implications: Since household size was negatively related to food security, the State ministry of health should pay serious attention to limiting the increasing population in the study area. Also, educational level, fertilizer use and adoption of soil conservation practices were positively related to food security. The State ministry of economic development should concentrates on strengthening both formal and informal education and vocational training among youths to reduce food insecurity. In addition, policies that will aid fertilizer distribution at a subsidized rate and encourage farmers to adopt sustainable soil conservation practices should be pursued to reduce food insecurity in the area.

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