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DETERMINANTS OF FOOD SECURITY AMONG RURAL HOUSEHOLDS IN SOUTHWESTERN NIGERIA: USDA FOOD SECURITY QUESTIONNAIRE CORE MODULE APPROACH

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Abstract. This study was carried out to estimate the extent of food security and its determinants among rural households in Nigeria. Data for this study was obtained from 180 rural households consisting of 1260 members through the use of a structured questionnaire. Data was analyzed with a descriptive technique and a less restrictive multinomial logistic regression model. The result found most rural households to be food insecure as they measure high on the food insecurity scale. Age, gender, marital status, access to credit, dependency ratio, household size, ownership of farmland and farming experience significantly influence food security categories. The study concluded that: female-headed married households were more food secure than male-headed households; an increase in age of household heads makes it more likely to be food secure, and so does access to credit facilities; conversely, an increase in family size and in the dependency ratio makes it less likely to be food secure. The study recommends that there should be provision and proper monitoring of credit facilities to small farmers in other to increase their scale of operation and improve their food security status. Also, adequate attention should be given to policy measures that address family planning in order to reduce the household size to a level the household heads can adequately cater for.

Keywords: food, food security, food insecurity, USDA, multinomial logistic

INTRODUCTION

Undoubtedly the most basic of all human survival needs, food is any edible substance consisting of nutritive components which, when consumed, sustains life, generates energy and provides growth, maintenance and health of the body. FAO et al. (2015) define food security as a condition where 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. Food insecurity on the other hand arises when there is uncertainty or restricted availability of nutritionally adequate and safe foods in socially acceptable ways (FAO, 2002).

Food insecurity is a major problem facing the world. FAO (2017) estimated that almost 1 billion people are chronically malnourished and food insecure around the world. Most of these people are found in developing countries, especially in Asia and Africa. According to African Food Security Briefs (AFSB, 2011), approximately one-third of the people in sub-Saharan Africa are undernourished. Shala and Stacey (2012) found out that the average amount of food available per person per day in the region was 1,300 calories, compared to the worldwide average of 2,700 calories. However, achieving sustainable economic development in developing

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countries will continue to be a delusion without well-nourished and healthy people. Food-secure people constitute a pool of potential that is capable of transforming a nation into a developed state. However, this may not occur if their health is compromised by nutritional deficiencies (Akerele et al., 2013).

Nigeria prides itself as the giant of Africa with the largest economy. Alas, it has risen from a low poverty level status in the 1960s to become the country with the highest poverty level in the world. Indeed, about 70% of Nigerians lived below the poverty line in 2014 (Olawale, 2018). The food insecurity rate among rural people and low-income urban households in Nigeria is 71% and 79%, respectively (Orewa and Iyangbe, 2010; Akerele et al., 2013). The Global Food Security Index (GFSI) of the Economist Intelligence Unit ranked Nigeria 80th among 105 countries in terms of food affordability, availability and quality. According to the Index, Nigeria recorded weak scores in the areas of public expenditure on agricultural research and development (0.0); presence of food safety net programs (0.0); gross domestic product per capita (3.0); proportion of population under the global poverty line (9.6); food consumption as a share of household expenditure (9.6); and protein quality (12.8) (Ahmed et al., 2015). As pointed out by Matemilola and Elegbede (2017), food insecurity in Nigeria was driven by insufficient food production, gender inequality, inefficient policies, corruption, conflict, civil insecurity, climate change, natural disasters and low technology for processing and storage.

Agriculture is the mainstay of Nigerian economy as over 70% of its active population is gainfully employed in the sector (Muhammad-Lawal et al., 2015). The sector had suffered neglect since the discovery of crude oil in the 1960s and had failed to contribute significantly to food security, poverty alleviation, women empowerment and improved human nutrition through the provision of balanced diets. However, efforts are now being made by the government to restore agriculture back to its original status before the oil boom and stamping out food insecurity (Ojo and Adebayo, 2012). Various programs and policy frameworks are designed to address food insecurity and malnutrition in Nigeria, including: the National Accelerated Food Production Project (NAFPP), Operation Feed the Nation (OFN), Agricultural Development Program (ADP), Structural Adjustment Program (SAP), National Poverty Eradication Program (NAPEP), National Economic Empowerment and Development

Strategy (NEEDS), Millennium Development Goals (MDG), Agricultural Transformation Agenda (ATA) and Agricultural Promotion Policy (APP). However, as noted by Akinyele (2009), these programs have recorded few successes, with the lackluster performances being largely attributed to the mistargeting of interventions. Nevertheless, the proper identification of the most vulnerable households and better understanding of the extent and quality of food insecurity experienced by the people will help achieving desirable outcomes. It is against this background that this research is carried out, although there are growing literature resources on food security and its determinants in Nigeria. Available studies, such as Olayiwola et al. (2017), Ubokudom et al. (2017), Ahmed et al. (2015) and Akerele et al. (2013), measured food security using a benchmark; these approaches failed to measure the severity of food insecurity among households. Besides, a study conducted by Fakayode et al. (2009) used the United States Department of Agriculture (USDA) approach to measure the extent of food insecurity among rural households in Ekiti but failed to estimate the determinants of food security categories. Apart from the study above, there are no recent and related studies that have analyzed the determinants of food security among rural households using the USDA approach, especially with respect to Oyo State. This study will therefore measure food security using a more intensive approach which measures the severity of food insecurity among households. Hence, this paper will specifically describe the socioeconomic characteristics of rural households, determine the level of food security among rural households, and estimate the determinants of food security levels among rural households in the study area.

LITERATURE REVIEW

Various approaches, such as cost of calorie, coping strategy index, dietary intake assessment, household dietary diversity score, food security index, food insecurity experience-based scale, household food insecurity assess scale, household economy approach, food consumption score, food poverty approach, household expenditure survey method, and the United States household food security survey module, have been employed to measure the food security/insecurity status. Agidew and Singh (2018) used a binary logit model to determine food insecurity in rural farm households of the Teleyayen sub-watershed area in Ethiopia using

a structured survey questionnaire, focus group discussion (FGD) and key informant interviews to collect data from 215 households. It was reported that shortage of farmland, poverty, recurrent drought and climate change, shortage of rainfall, and land degradation are the determining factors for food insecurity, whereas variables such as gender of household head, policy support, land redistribution, farmland topography, soil fertility, and erosion do not have a significant influence. Tarraf et al. (2018) employed the Health Canada's Household Food Security Survey Module and a multivariate probit model to measure food insecurity among migrant sub-Saharan African and Caribbean households in Ottawa, Canada. The result revealed that 45.1% were food insecure, and that variables such Caribbean origin, low education attainment, lone motherhood, living in Canada for five years or less and reliance on social assistance influence household food insecurity. Olagunju et al. (2016) used the food security index, surplus/shortfall index and a probit model to determine factors influencing the food security status of customers of the Nigerian Bank of Agriculture (BOA). Their study found that 64% of households sampled were food secure, and concluded that the bank has a positive impact on the households' food security status. Akerele et al. (2013) used the coping strategy index to determine the food insecurity status of households in Ekiti state, Nigeria. Their results showed that the overall incidence of food insecurity was 58.8% while the depth of food insecurity was 19.5%. It was concluded that food insecurity declined with higher levels of income and educational attainment but increased with household size and number of dependants. In their study on the determinants of food security among households in Nsukka metropolis of Enugu State, Nigeria, Arene and Anaeji (2010) used the food security index approach and a binary logistic regression model. Their survey found that 60% of the households sampled were food insecure, and that age and increased income had a direct relationship with food security status. Similarly, Ubokudom et al. (2017) determined the food security status of 343 food crop farmers' households in Akwa-Ibom, Nigeria, using the food security index approach. It was concluded that educating household members, making fertilizers available to farmers at a subsidized rate, controlling birth rates, and disseminating information related to soil conservation practices to farmers would reduce food insecurity problems in the area. Abbasi et al. (2016) measured the extent of food insecurity of 166 urban and peri-urban households in Alborz province, Iran, using the household food security survey module of the U.S. Department of Agriculture. The result revealed that more than half of the sample population suffered from food insecurity. The study concluded that unemployment, low income and lack of education expose families to the risk of food insecurity. Similarly, Obayelu (2012) examined the households' food security status and its determinants in north-central Nigeria using cross-sectional data from 396 households. The result showed that 16%, 36%, 28% and 21% of the households were food secure, food insecure without hunger, food secure with moderate hunger and food insecure with severe hunger, respectively. The study concluded that to transit from food insecure to food secure, birth control, participation in agriculture and gender-sensitive food insecurity alleviation policies that enhance endowments of female-headed households should be encouraged.

METHODOLOGY

Study area
The study was conducted in Oyo West and Oyo East Local Government Areas of Oyo State, Nigeria. Oyo is an inland state in south-western Nigeria, with its capital at Ibadan. It is bounded in the north by Kwara State, in the east by Osun State, in the south by Ogun State and in the west partly by Ogun State and partly by the Republic of Benin. Oyo West is a Local Government Area in Oyo State, Nigeria. Its headquarters are in the town of Ojongbodu. It has an area of 526 km² and a population of 136,236 according to the 2006 census. Oyo East is bounded to the north-west by Atiba Local Government Area, to the north-east by Ori-ire Local Government Area, to the east by Ogo-Oluwa Local Government Area, to the south by Afijio Local Government Area and to the west by Oyo West Local Government Area. It covers an area of 144 km² and has a population of 123,846 according to the 2006 census. Agriculture is the main occupation of the people of Oyo West and East. The local climate favors the cultivation of crops like maize, yam, cassava, millet, rice, plantains, cocoa, palm produce, cashew etc.

Sampling techniques and sample size
A multi-stage sampling technique was used for this study. The first stage involved a random selection of

Oyo West and East Local Government Areas out of the thirty-three LGAs in Oyo State. The second stage involved a purposive selection of three villages from each of the selected Local Government Areas. Awosan, Ajagba and Irepodun were the villages purposively selected from Oyo East Local Government Area while Onilefun, Idi-araba and Ilu-aje villages were purposively selected from Oyo West Local Government Area. The third stage involves a purposive selection of thirty rural households from each of the purposively selected villages, making a total sample size of 180 rural households. The

purposive sampling technique was employed in this study as there was not enough information on the sample frame of rural households in the study area.

Data source and data collection method

Data for this study was obtained from a primary source; it was collected from rural households from August to December 2018 through the use of a structured questionnaire. This study collected data on the households' socioeconomic characteristics such as: age of household heads, education level, gender, household size, income,

Table 1. Eighteen (18) households' food security items

No.	Questions/statements	NT	ST	OT
1.	We were worried our food would run out before we got money to buy more			
2.	The food we bought just did not last and we did not have money to get more			
3.	We could not afford to eat a balanced diet			
4.*	We relied on only a few kinds of low-cost food to feed the children			
5.*	We could not feed the children a balanced meal			
6.*	The children were not eating enough because we just could not afford enough food			
7.	Did some adults ever have to eat less than you felt you should eat because there was not enough money to buy food?			
8.	How often did this happen in the last 12 months?			
9.	Did some adults ever have to eat less than you felt you should eat because there was not enough money for food?			
10.	Were some members ever hungry but did not eat because you could not afford enough food?			
11.	Did some members ever lost weight within the last 12 months because there was not enough food?			
12.	Was there ever a time within the last 12 months that some adults could not eat for a whole day because there was not enough money to buy food?			
13.	How often did this happen in the last 12 months?			
14.*	Did you ever have to cut the size of some of the children's meal within the last 12 months because there was not enough money to buy food?			
15.*	Did any of the children ever had to cut the size of some of the children's meals within the last 12 months because there was not enough money to buy food?			
16.*	How often did this happen in the last 12 months?			
17.*	In the last 12 months, were the children ever hungry but you just could not afford more food?			
18.*	In the last 12 months, did any of the children ever not eat for a whole day because there was not enough money for food?			

NT = Never true, ST = Sometimes true, OT = Often true
*Not applicable to households without children.
Source: USDA, 2000.

years spent in school, etc. Data was also collected on food insecurity experienced by rural households in the last 12 months (including how frequently it occurred).

Analytical techniques and model specification

Data collected from the field was analyzed using descriptive and inferential techniques. The descriptive techniques used were frequency counts, percentages, standard deviation and means. The multinomial regression analysis was used as an inferential technique.

Food security analysis

The food security status of rural households was measured using the United States Department of Agriculture (USDA, 2000) food security questionnaire core module. The USDA categorizes households using a constructed food security scale that ranges between 0 and 10 for households without children (>17 years old) and between 0 and 18 for households with children (<17 years old).

Households are classified into food security status categories based on the number of food-insecure responses to the questions consistent with statistical evidence that this number reflects the level of food hardship experienced by the family. The four categories of household food security are:

- High food security (HFS): if a household (with or without children) reported less than 3 food-insecure responses.
- Marginal food security (MFS): if a household reported more than 2 but less than 8 food-insecure responses for households with children, and more than 2 but less than 6 food insecure responses for households without children.
- Low food security (LFS): if a household reported more than 7 but less than 13 food-insecure responses for households with children, and more than 5 but fewer than 9 food-insecure responses for households without children.
- Very low food security (VLFS): if a household reported more than 12 food-insecure responses for households with children, and more than 8 but fewer than 11 food-insecure responses for households without children.

The household's response to each of the questions was first coded as either affirmative or negative; each

Table 2. USDA food security classification

Status	Number of affirmative responses	
	households with children	households without children
High food security	0–2	0–2
Marginal food security	3–7	3–5
Low food security	8–12	6–8
Very low food security	13–18	9–10

Source: USDA, 2006.

question had three response categories: never true, sometimes true and often true. "Sometimes true" and "often true" were considered affirmative responses because they indicated that the condition occurred at some time during the period covered by the study. However, the scale made no distinction between the three affirmative responses.

Multinomial logistic regression analysis

Multinomial logistic regression was used to analyze the determinants of food security of rural households. That routine is employed in modeling processes which involve a single outcome among several alternatives that can be ranked, although food security is represented as ordered statuses with severity increasing from "high food security" to "very low food security." However, using a less restrictive multinomial logit model was considered more appropriate than using an ordered logit or ordered probit model. This is because ordered logit or probit models involve estimating specific cut points, whereas the determinants of food security in the model were expected to affect food security categories in different ways.

The multinomial logit model determines the probability that household i experiences one of j outcomes of high food security, marginal food security, low food security and very low food security. That probability is given by:

$$P_{ij} = E\,(Y_i = j/X_i) = F\,(\alpha + \beta_r X_i), j = 1, 2 \ldots 4 \quad (1)$$

$$= \frac{1}{1 + \Sigma_{j=1}^{3} e^{Zi}} \quad (2)$$

where:

$$Z_i = \alpha + \beta_r X_i + e_t \qquad (3)$$

$$P_{ij} = \frac{e^{Zi}}{1 + \Sigma_{j=1}^3 e^{Zi}} \qquad (4)$$

where:

$P_{ij} = E\ (Y_i = j/X_i)$ is the probability of the reference category

P_{ij} is the probability of being in each of the groups compared to the reference group

Y_i is the food security outcome experienced by household i

β_i is the set of coefficients to be estimated

X_i is the set of explanatory variables which are:

X_1 is the gender of the household head (1 = male, 0 = female)

X_2 is the age of the household head (years)

X_3 is the marital status of the household head (1 = married, 0 = otherwise)

X_4 is the household size (number of individuals)

X_5 is the number of years of education of the household head (years)

X_6 is the ownership of farm (1 = own farmland, 0 = otherwise)

X_7 is the farming experience (years)

X_8 is the income from non-farm activities (NGN)

X_9 is the access to credit (1 = access, 0 = otherwise)

X_{10} is the dependency ratio (ratio of inactive labor force, i.e. aged less than 15 and above 65, to the active labor force, i.e. aged between 15 and 65, within a household)

e_t is the disturbance term.

For a comprehensive interpretation of the coefficients of the multinomial logit, Gujarati (2004) and Green (2005) suggested the derivation of the marginal effects of the independent variables. According to Green (2005), by differentiating equation (2), the marginal effect is obtained as:

$$\delta_j = \frac{\partial Pi}{\delta Xi} = P_j\ [\beta_j - \Sigma_{k=0}^j Pk\beta k] = P_j[\beta_j - в] \qquad (5)$$

However, in other to estimate the model, one of the outcome variables had to be omitted and defined as the base category. In this study, very low food security was chosen as the benchmark to which other food security levels were compared.

RESULTS AND DISCUSSION

Socioeconomic characteristics

The result of the socioeconomic characteristics revealed that most (61.67%) rural farming households are male-headed. The dominance of males over their female counterparts may be due to the fact that most farming activities require more strength which most females may not be able to provide; this corroborates the findings by Ahmed et al. (2015). One-quarter (25%) of rural household heads were between 31 and 40 years old, with a mean of 49 years. This implies that most household heads are still very agile, energetic and within their productive age, which may positively influence their food security status. The above supports the findings by Olayiwola et al. (2017). A larger proportion (89.44%) of rural farming household heads were married, implying that most household heads were matured and responsible to cater for their households, and had a clear knowledge of their wellbeing. There is also an implanted sense of responsibility as marital status prompts commitment to business because of the family needs that must be met. Subsequently, this would enhance productivity and improve their food security status; the above is in line with findings by Ayoade and Adeola (2012). Almost half (43.89%) of rural farming households were composed of 4 to 6 persons, with a mean household size of 7. This implies that most household heads had enough people at home to employ household labor on their farms. The above is in line with findings by Ezeibe et al. (2015). More than one-quarter (37.78%) of rural farming households had less than 10 years experience in farming, with a mean of 19 years. This implies that most household heads had enough experience in farming, which may positively influence their productivity, increase their income and improve their food security status. The above corroborates the findings by Ambali et al. (2012).

Food security category

The USDA food security core module questionnaire was used to categorize the households into four food security levels, namely: high food security, marginal food security, low food security and very low food security. The results in Table 4 revealed that most (66.67%) households were at the very low food security level, 1.67% were in the high food security category, 3.89% were in the marginal food security category while 27.78% were in the low food security category. This implies that a very large

Table 3. Distribution of respondents according to their socio-economic characteristics

Variable	Frequency	Percentage	Mean	Standard deviation
Gender				
Female	69	38.33		
Male	111	61.67		
Total	180	100.00		
Age				
≤30 years	13	7.22	49	12.85
31–40 years	45	25.00		
41–50 years	42	23.33		
51–60 years	43	23.89		
>60 years	37	20.56		
Total	180	100.00		
Marital status				
Single	2	1.11		
Married	161	89.44		
Widowed	11	6.11		
Divorced	6	3.33		
Total	180	100.00		
Household size				
1–3 persons	26	14.44	7	2.84
4–6 persons	79	43.89		
7–9 persons	51	28.33		
10–12 persons	19	10.56		
>12 persons	5	2.78		
Total	180	100.00		
Farming experience				
≤10 years	68	37.78	19	15.19
11–20 years	44	24.44		
21–30 years	27	15.00		
31–40 years	21	11.67		
>40 years	20	11.11		
Total	180	100.00		

Source: field survey, 2018.

proportion of the households were in the very low food security category. Although the bulk of food produced comes from rural areas, rural Nigerian households are

Table 4. Food security category

Food security category	Frequency	Percentage
High food security (HFS)	3	1.67
Marginal food security (MFS)	7	3.89
Low food security (LFS)	50	27.78
Very low food security (VLFS)	120	66.67
Total	180	100.00

Source: field survey, 2018.

at a high food insecurity level, which is a very alarming conclusion. The above is consistent with findings by Ayoade and Adetunbi (2013) who reported that ca. 65% of farming households in south western Nigeria were food insecure.

Determinants of food security

Determinants of high food security among rural households

The Wald chi-square revealed that the variables in the model are fit to explain the determinants of food security among rural households. Also, the probability of chi-square revealed the overall significance of the model at a 1% level ($p < 0.01$). The results in Table 5 below showed that gender, marital status, access to credit and dependency ratio significantly affect the high food security category compared to the very low food security category. The marginal effect of gender indicates that for HFS households, being male-headed significantly reduces their food security status by 12.4% at a 10% probability level ($p < 0.1$). The marginal effects of the marital status showed that the food security status of married HFS households is likely to significantly increase by 32.9% at a 1% probability level ($p < 0.01$). This implies that married HFS households are more food secure than their counterparts, basically because couples put their resources together which could generate more income than their unmarried counterparts, hence making them food secure. This corroborates the findings by Ubokudom et al. (2017). The marginal effect of the coefficient of access to credit shows that the food security status of HFS households that have access to credit is likely to significantly increase by 32% at a 5% probability level ($p < 0.05$). The marginal effects of the coefficient of dependency ratio

Table 5. Determinants of high food security among rural households

High food security	Variables	Coefficient	Standard error	t-value	Marginal effects
	Gender	−7.211*	3.975	−1.810	−0.124
	Age	−0.122	0.130	−0.940	−0.002
	Marital status	19.206***	6.735	2.850	0.329
	Household size	0.499	0.319	1.560	0.009
	Years of education	−0.641	0.542	−1.180	−0.011
	Ownership of farmland	−2.886	1.916	−1.510	−0.049
	Farming experience	−0.242	0.250	−0.970	−0.004
	Non-farm income	0.000	0.000	−1.620	0.000
	Access to credit	1.874**	0.907	2.070	0.032
	Dependency ratio	−27.283*	15.631	−1.750	−0.468
	Constant	9.354	8.412	1.110	
	Prob > chi^2	0.0000			
	Pseudo R^2	0.2025			
	Wald chi^2 (30)	700.96			
Very low food security	Base category				

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source: field survey, 2018.

shows that the food security status of HFS households would likely deteriorate as a result of an increase in their dependency ratio. This implies that an increase in the dependency ratio by one member would likely result in a 46.8% decrease in the food security status of HFS households. The above corroborates the findings by Bigsten et al. (2002) and Ubokudom et al. (2017).

Determinants of marginal food security among rural households

The result in Table 6 below showed that gender, age, marital status, household size, ownership of farmland and farming experience significantly affect the food security status of marginal food secure households compared to households with a very low food security status. The marginal effects of the coefficient of gender showed that food security status of male-headed MFS households significantly decreases by 7.44% at a 1% probability level ($p < 0.01$) compared to their female-headed counterparts. This is contrary to the findings by

Ahmed et al. (2015). The marginal effects of the coefficient of age showed that the food security status of marginal food secure households increases as the age of the household heads increases; this implies that as the age of MFS household heads increases by 1 year, the food security status of MFS households would probably increase by 0.48%. This is consistent with findings by Arene (2008). The marginal effects of the coefficient of marital status showed that the food security status of married MFS household heads is likely to significantly increase by 44.24% at a 1% probability level ($p < 0.01$). This implies that married MFS household heads are more food secure than their counterparts. The above is in agreement with the findings by Ubokudom et al. (2017). The marginal effects of the coefficient of household size showed that an increase in household size increases the probability of being food insecure among MFS households. This implies that if the size of the household increases by 1 person, the food security status of MFS households would decrease by 2.48%,

Table 6. Determinants of marginal food security among rural households

Marginal food security	Variables	Coefficient	Standard error	t-value	Marginal effects
	Gender	–2.871***	1.069	–2.690	–0.0744
	Age	0.166**	0.071	2.340	0.0048
	Marital status	16.400***	1.082	15.150	0.4424
	Household size	–0.883*	0.481	–1.830	–0.0248
	Years of education	–0.175	0.137	–1.280	–0.0045
	Ownership of farmland	–0.483**	0.224	–2.160	–0.0121
	Farming experience	–0.127*	0.071	–1.780	–0.0036
	Non-farm income	0.000	0.000	0.120	0.0000
	Access to credit	0.513	0.756	0.680	0.0104
	Dependency ratio	–0.338	2.456	–0.140	0.0239
	Constant	–18.099***	2.212	–8.180	
	Prob > chi^2	0.0000			
	Pseudo R^2	0.2025			
	Wald chi^2 (30)	700.96			
Very low food security	Base category				

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source: field survey, 2018.

because a large household size affects the availability of food per capita in the family. This is in line with the findings by Adebayo (2012). The marginal effects of the coefficient of ownership of farmland showed that MFS households who own their farmland are less likely to be food secure; this pattern is significant at a 5% probability level ($p < 0.05$), and implies that the food security status of MFS households who own their farmland decreases by 1.21%. The marginal effects of the coefficient of farming experience revealed that as the farming experience increases, the probability of being food insecure among MFS households increases. This implies that if the farming experience increases by 1 year, the probability of being food insecure decreases by 0.36% among MFS households.

Determinants of low food security among rural households

The result in Table 7 below showed that farming experience and dependency ratio significantly affect the food security status of low food secure households compared to very low food secure households. The marginal effects of the coefficient of farming experience revealed that as the farming experience increases, so does the probability of being food secure among low food secure households. This pattern is significant at a 10% probability level ($p < 0.1$), and implies that if farming experience increases by 1 year, the probability of being food secure increases by 0.77% among LFS households compared to the VLFS category. This result is in consonance with findings by Oluyole (2009) and Ahmed et al. (2015). The marginal effects of the coefficient of the dependency ratio show that the food security status of LFS households would likely decrease as a result of an increase in the dependency ratio. This implies that an increase in the dependency ratio by one member would probably result in a 41.41% decrease in the food security status of LFS households. This corroborates the findings by Bigsten et al. (2002) and Ubokudom et al. (2017).

Table 7. Determinants of low food security among rural households

Low food security	Variables	Coefficient	Standard error	t-value	Marginal effects
	Gender	0.015	0.371	0.040	0.0038
	Age	–0.018	0.027	–0.670	–0.0037
	Marital status	–0.244	0.583	–0.420	–0.0528
	Household size	–0.013	0.095	–0.140	–0.0024
	Years of education	0.016	0.035	0.470	0.0033
	Ownership of farmland	0.128	0.079	1.620	0.0257
	Farming experience	0.038*	0.021	1.850	0.0077
	Non-farm income	0.000	0.000	0.040	0.0000
	Access to credit	0.385	0.304	1.270	0.0771
	Dependency ratio	–2.066**	0.982	–2.10	–0.4141
	Constant	0.631	1.667	0.38	
	Prob > chi^2	0.0000			
	Pseudo R^2	0.2025			
	Wald chi² (30)	700.96			
Very low food security	Base category				

**$p < 0.05$, *p < 0.1
Source: field survey, 2018.

CONCLUSION AND RECOMMENDATION

The proper identification and better understanding of the extent of food insecurity and its determinants, especially among rural households, is a step towards proffering a solution to this menace. This study found that most rural households were food insecure as they measured high on the food insecurity scale, which is evidenced by the food security categories in the study area. The study also revealed that gender, marital status, access to credit and dependency ratio significantly influence the food security status of highly food secure households. Gender, age, marital status, household size, ownership of farmland and farming experience significantly influence the food security status of marginally food secure households while farming experience and dependency ratio significantly influence the food security status of low food secure households. The study concluded that female-headed married households were more food secure than male-headed households. An increase in age of the household head was found to increase the likelihood of being food secure. Access to credit facilities also increases the likelihood of being food secure whereas an increase in family size and dependency ratio has an opposite effect. This study recommends that programs and policies designed to create job opportunities be targeted at the most vulnerable groups (women and youths) as this would help reduce their dependency and increase their food security status. Moreover, there should be provision and proper monitoring of credit facilities to small farmers as this would go a long way in increasing their scale of operations while improving their food security status. Adequate attention and priority should be given by the government to policy measures directed towards family planning to reduce household size to a level the household heads can adequately cater for.

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