

Prevalence and factors affecting food insecurity among small-holder farmers in South-Western Nigeria

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Abstract

Rural people in Nigeria have become more vulnerable to malnutrition, erratic supply of food items, unaffordable food costs, low quality foods and sometimes complete lack of food in spite of abundant agricultural resources. This paper sought to examine food insecurity among smallholder food crop farmers by identifying its prevalence and the causative factors and coping strategies in South-western Nigeria. A multi-stage random sampling approach was used in selecting the smallholder farming households' sample. The study adopted descriptive analysis such as frequency distribution and percentage analysis to describe the socio-economic characteristics of the respondents. Logit Regression Model was used to determine the effect of socio-economic factors on household food insecurity while FGT index was used to estimate the food insecurity status of the respondents. The paper concluded that majority (75%) of the smallholder food crop farming households were earning their living primarily through farming. Also, households who permanently owned the land tend to be more food secure than those without land while a unit increase in respondents' income, will lead to reduction in the relative chance of the household being food insecure by 2.04%. The study therefore recommended among other things that the Government should increase budgetary allocation to farming system to reflect the significant importance that food security have for the well-being of the rural farming households.

Key words: Food security, Small holder, Farmers, Prevalence, Factors, Nigeria

Introduction

Most recently, there have been much feelings of worry about the impending risk of food crisis in many nations, as well as Nigeria (Attah, 2012). Food and Agriculture Organization (FAO) (2002) described food security as a situation when all people continuously have physical and economic

access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Therefore, the principal goal of food security is for people to get enough food always, and ability to use the food to meet the body's needs (FAO, 2002).

According to the World Bank (2001), food

security can be identified through three cardinal components such as food availability, food accessibility, and food utilization. The implication of this is that any nation whose food production level is incapable to satisfy these three principles can be considered being food insecure. Any system where food demand is not sufficiently met by supply is certainly experiencing impending food disaster. It is in the light of the above that realization of food security becomes very important in any country.

In addition, food insecurity and hunger are entwined. Hunger on the other hand is considered as a situation in which there is an insufficient amount of available food and malnutrition that reveals unbalanced diets intake (Macnamara, 1973). Both are upsetting tools to productive capacity of the citizens which would in turn impact negatively on the general economic development of many countries. The twin problem of hunger and malnutrition is closely linked with poverty.

Regrettably, the Nigeria's situation in terms of food security is very unjustifiable and nasty as a substantial proportion of the Nigerian people is wallowing in abject poverty. So, with regard to the Nigeria present situation, Nigeria is far from being completely food secured (Ojo & Adebayo, 2012). Nigeria is one of the food-deficit countries in sub-Saharan Africa although it is arguably recuperating in terms of production than the others. But in spite of the huge agricultural potential of Nigeria, with the vast majority of people engaged in agriculture operating though at subsistence level, the country still remain an importer of food (Ojo & Adebayo, 2012).

Since Nigeria got independence in 1960, Agriculture was a foremost contributor to the Nigeria economy. Nevertheless, it has been transformed from small to medium and large-scale level of the market by commercial activities. Apart from oil sector, Agriculture is the second largest contributor to the National economy in Nigeria, accounting for 41.84% of the GDP in 2009 and employing nearly 70% of the national work force. The farmers are mostly small-scale subsistence farmers representing approximately 14 million with an average farm size of 1 hectare in the south

and 3 hectares in the north of Nigeria (Corporate Nigeria, 2011). The principal cash crops comprise rubber, oil palm and cocoa while major staple foods include yams, rice, maize, cassava, millet and sorghum. Likewise, Nigeria agricultural sector covers timber production and animal husbandry like rearing of sheep, cattle, goats and poultry including fisheries (Offu, 2013).

Unfortunately, the agriculture sector in Nigeria became less significant to the government upon the detection of oil in the 1970s because government has placed high premium on oil industry. Therefore, Nigeria turns out to be deeply dependent on importation of food (Adeagbo, 2012). The rural areas have become even more vulnerable to malnutrition, erratic supply of food items, unaffordable food costs, low quality foods and sometimes complete lack of food. This situation is more prevalent in many parts of Nigeria (Akinyele, 2009). This study therefore aims to help fill the knowledge gap on food insecurity among smallholder food crop farmers by identifying its prevalence and the causative factors and coping strategies in South-western Nigeria.

Materials and Methods

Study area

This study was carried out in South-west Nigeria. It has six states; Ekiti, Lagos, Ogun, Ondo, Osun and Oyo. It is predominantly a Yoruba language region, even though there are various vernaculars even within the same state. The region is characterized with varying weather conditions between the two distinguishing seasons in Nigeria; the rainy season (March - November) and the dry season (November - February). Southwest lies within latitudes 4° – 14°N and longitudes 3° – 14°E and exhibits the typical tropical climate of averagely high temperature and high relative humidity. There is usually a relative high temperature during the dry season with the mean around 30°C and low temperature during the rainy season, particularly between July and August as the temperature could be reduced to 24° C. The distribution of rainfall varies from about 1000 mm to about 2000 mm (Idowu et al., 2013).

In terms of vegetation distribution, there are three main types of vegetation, namely, mangrove forest, tropical rain forest and guinea savannah. The mangrove forest is found mainly in Lagos state and some part of Ogun and Ondo states and the tropical rain forest is found mainly in Ogun, Ondo, Ekiti states and some part of Oyo state while the Guinea and derived savannah are found mostly in Osun and some part of Oyo and Ogun states. Specifically, the data used for this study were collected precisely in Ogun, Osun and Oyo States (fig. 1) due to their agrarian potentials (Idowu et al., 2013).

Sampling Procedure and Sample Size

A multi-stage random sampling approach was used in selecting the respondents' sample. Firstly, three states (Oyo, Ogun and Osun states) were randomly selected out of the six states of the South-west geo-political region. Secondly, five Local Government Areas (LGAs) in each of the three states (Table 1) were purposively chosen making fifteen LGAs in total (considering the agricultural potential and intensity of farmers' participation particularly in food crops) whereas one agrarian village was randomly chosen per each selected LGA totaling fifteen villages. Thirdly, a random selection of sixteen farmers from each village was done which led to two hundred and forty (240) farmers being interviewed in the fifteen selected villages (155 males and 85 females). Primary data was used for this study and this was collected with the aid of a well-structured questionnaire / interview guide. Each farmer was interviewed separately and each interview lasted for about 1 hour.

During these interviews, issues related to food security as it concerns the enabling and constraining situation for food availability and affordability to farming households were explored. Farmers were also invited to discuss issues regarding their integration into the larger context of food production, such as input and output prices, access to local and neighboring city markets, and so forth. Farmers were accompanied at their farms through several sessions of pre-arranged visits. The researcher participated in farm-related activities such as planting, weeding and harvesting. These

farm visits provided an opportunity for informal discussions on different aspects of agricultural resource use and constraints for individual farmers. The researcher also attended a number of meetings of farming groups of which participating farmers were members. Such attendance provided insights into the societal context of knowledge and resource sharing, as well as the appreciation of challenges to food crop production beyond the immediate household of the participating farmers.

Data were gathered on the following aspects such as source of food, number of meals per day, food challenge, coping strategy, land ownership, income, distance from farm, types of food crops, size of the farm, influences on choices of crops cultivated on food security and their associated problems and challenges; the socio-economic factors such as gender, age, marital life, and education as they affect food security of individual farmers. This study delineated smallholder farmers who cultivate maize and beans for subsistence, representing the key constituents of rural communities across South-western Nigeria. The exercise was carried out between January 2019 and November 2019.

Method of Data Analysis

The study adopted descriptive analysis such as frequency distribution and percentage analysis to describe the socio-economic characteristics and statistics of the smallholder farming households. For the empirical models, two empirical models such as Logit Regression Model and Foster, Greer and Thorbeck (Foster, Greer & Thorbeck (1984)) (FGT) index were adopted for the analysis. Logit Regression Model was used to determine the effect of socio-economic factors on household food insecurity. This model was used by Mequanent et al. (2014) to determine household food security among farming households of southwest Ethiopia. Likewise, The FGT index was adopted to estimate the food insecurity status of the respondents as used by Mequanent et al. (2014).

Model Specifications

a. Foster, Greer and Thorbeck 1984 (FGT) index.

The general formula of FGT index is given by:

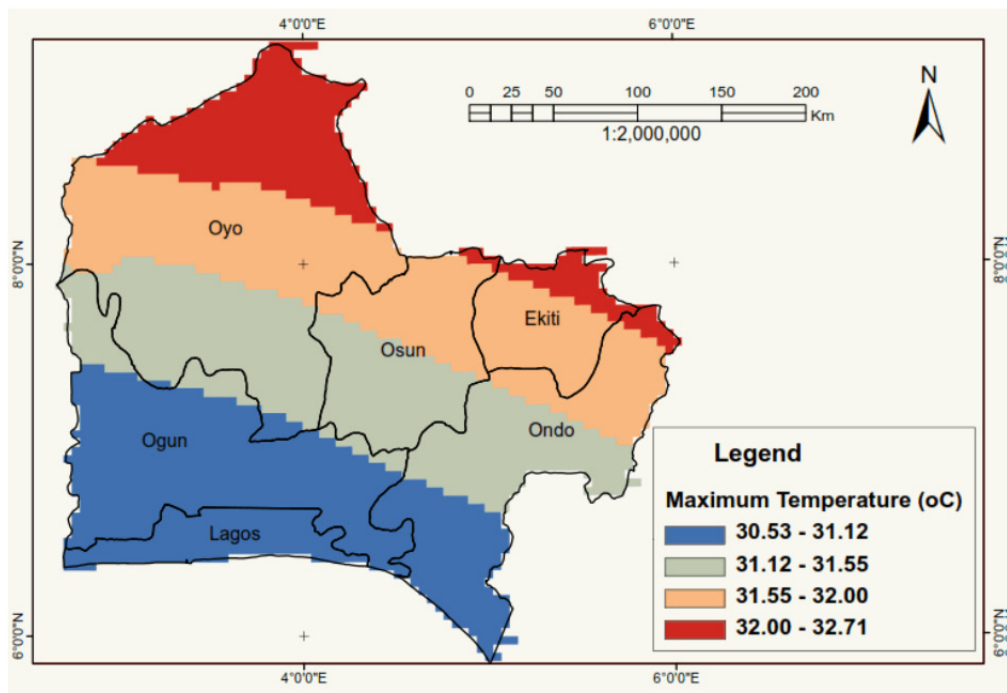


Fig. 1. Map of South-west Nigeria

Table 1. Names of villages and LGAs for data collection

State	LGAs	Villages	No. of respondents
Ogun	Ado Odo/Ota	Agbojedo	16
	Odigbo	Agunla	16
	Ewekoro	Akinbo	16
	Obafemi owode	Asore	16
	Imeko Afon	Araromi	16
Oyo	Afijio	Elepe	16
	Itesiwaju	Ariyo	16
	Kajola	Okeho	16
	Akinyele	Onidundu	16
	Ibarapa North	Opomu	16
Osun	Ori Ade	Aba Lawani	16
	Isokan	Alara	16
	Boripe	Idi Osan	16
	Atakumasa	Odesomi	16
	Ede North	Elero	16

Source: Computed by the Author, 2019

$$P\alpha = 1/n \sum_{(i=1)}^q \left[\frac{z-y_i}{z} \right] a \quad (1) \quad \text{Where } Z \text{ is the } 2/3 \text{ of the Mean per Capita Household Expenditure (MPCHHE)}$$

Where y_i = welfare index per capita expenditure; q = is the number of people in the population of n ; α = food security that can take the value of zero, one or two. 0 - is the food security incidence; 1 - Food security gap

2 - Food security severity; Z = is the food security index and is given by

$$z = \frac{PC}{MPC} \quad (2)$$

PC = per capita food expenditure of i th household and MPC = 2/3 mean per capita food expenditure of all households; F_i = food security index; When $F_i \geq 1$ = food secure i th household and $F_i \leq 1$ = food i th insecurity household.

b. Logit Regression Model

The logit model postulates that the probability (P_i) of being food secure is a function of an index (Z_i), where (Z_i) is an inverse of the standard logistic cumulative function of P_i i.e.

$$P_i(y) = f(Z_i) P_i = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_i)}} \quad (3)$$

$$1 - P_i = \frac{1}{1 + e^{-z}} \quad (4)$$

Then, the equation above can be expressed as:

$$\frac{P_i}{1 - P_i} = \frac{1 + e^z}{1 + e^{-z}} = e^z \quad (5)$$

Taking the natural log of the equation:

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = Z_i = \beta_1 + \beta_2 X_1 + \dots + \beta_k X_k + U_i \quad (6)$$

Z = represents set of factors affecting household food security; β = regression coefficient; U = error term

The explicit form of the equation is given by

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \dots + \alpha_n X_n \quad (7)$$

Y = food security/food insecure; α = coefficient of explanatory variables; X = vector of independent variables; X_1 = age; X_2 = sex; X_3 = household size; X_4 = marital status; X_5 = land ownership; X_6 = educational level; X_7 = income; X_8 = group membership; X_9 = Farm size

Results and Discussion

Socioeconomic characteristics of the respondents

About seventy seven per cent (77.1%) of the sampled farming households were headed by men while 22.9% headed by women. This infers that small-scale food crop farming is more of a male activity. This result is in conformity with the findings of Jimoh & Haruna (2007). Approximately thirty eight per cent (38.3%) of farmers in our survey fell within the age range of 21 to 40 years while only 16.3% exceeds sixty years old (>60). The mean age was ± 42 years which evidently shows that most of the sampled farming households were in their active age with high propensity to engage in farming activities at any given time. Table 2 thus reflects the distribution of socio-economic characteristic of the small holders' farmers in the study site.

This finding validates the findings of Famuyide et al., (2013) where 67% of the respondents were in their active age between 31-50 years old. With regards to marital status, 60% of the respondents were married and only 5% were single.

This outcomes may determine how secured a family is considering the fact that married farming households may have opportunity of family labour to enhance their productivity than the single farming households who may be depending largely on hired labour at an extra cost (Amusa & Jimoh, 2012). Table 2 reveals the socio-economic characteristics of the small holders' farming household in South-western zone of Nigeria.

Furthermore, the education level was found to be relatively low in all study sites, with 33, 43, 17.5 and 4% of farming household heads having no formal education, primary, secondary and tertiary education, respectively. That is, most farmers in the study site were not well educated or unable to

Table 2. Distribution of socioeconomic characteristics of the respondents

Gender		
Male	185	77.1
Female	55	22.9
Age group		
≤20	41	17.1
21 – 40	92	38.3
41 – 60	68	28.3
61 – 80	39	16.3
Marital status		
Single	19	7.9
Married	147	61.3
Divorced	25	10.4
Widow / widower	49	20.4
Education		
No formal education	81	33.8
Primary	99	41.2
Secondary	40	16.7
Tertiary	20	8.3
Main work		
Farming	135	56.3
Trading	62	25.8
Civil service	43	17.9

Source: Field survey, 2019

read or write with ease or fluency (semi-literate). This result does not align with the findings of Ayanwuyi (2013) who posited that rural farmers in Surulere Local Government area of Oyo State were well educated. In terms of main source of livelihood, about 56.3% of the sampled farmers chose farming as their primary job while those that combined other job like trading and civil service accounted for 25.8% and 17.9% respectively. All of them are however engaging in food crops production at small scale level in order to boost food provision for their households.

Level of food insecurity

This section described food insecurity incidence, gap (depth) and severity using FGT food insecurity index. The results showed that the total per capita household expenditure was ₦1,898, 219.8 while the mean per capita household

expenditure was ₦9149.134. Food insecurity line which is the 2/3 of the mean per capita household expenditure was ₦575.74 (Table 3).

Table 3. Level of food insecurity

FGT Index	Estimate
food insecurity incidence (F0)	0.56
food insecurity gap (F1)	0.07
food insecurity severity (F2)	0.05

Source: Field survey, 2019

Though, any household's per capita expenditure below the amount in the food insecurity line was described as being food insecure, while those households whose per capita expenditure was above or equal to the amount in the food insecurity line was described as being food secure.

Furthermore, the head count ratio also known as food insecurity incidence (F0) was 0.56. This implied that 56% of the smallholders farming households in South-western Nigeria were below the food insecurity line meaning that only 44% of them were food secure. With regards to the food insecurity depth (gap) (F1), the estimate was 0.07 indicating that every food insecure household would require about 8% increase in their spending in addition to their per capita income. Likewise, the food insecurity severity (F2) was 0.03; this is measured as weighted average of the square distance below the food insecurity line (minimum requirement). This result therefore implied that 5% of the smallholders farming households were severely food insecure in the study area. This result was in agreement with the findings of Mequanent et al., (2014) who recorded about 42.9% incidence rate of food insecurity.

Households' Food Security

All households are involved in agriculture but not all of them derive income from farming. Though, 75% of them earn their living primarily through farming, 21.2% bought their food and only 3.8% obtained their food through transfer income such as gift, family support etc. It can be inferred

that majority of the respondents were peasant farmers producing food for their households with little or no surplus for sale (Twaha, 2015). With regard to number of meals taken per day, 52.1% took two meals per day, 32.1% had three square meals, and 15.8% took a meal per day. This result is an indication that majority of the smallholder food crop farmers were not affluent in terms of availability of basic needs as some of them still skip some meals not only because of insufficient food but perhaps due to paucity of fund required to cater for other livelihood demands. Table 4 reflects the food security situation of the small holders' farmers in the study site.

Furthermore, in terms of time of food shortage period, the study also revealed that majority (68.8%) of the small scale farmers in the study area experienced food shortage during dry season (around October to March of the following year). Consequently, it became somehow difficult for them to feed their families adequately during this off season period.

Likewise, about 25.4% experienced relatively food shortage around April to June and very few of them (5.8%) experienced their own around July to September. These arrays of periods depend on types of food crops each group of respective farmers engaged in and these periods have significant effects in their means of livelihoods. To further buttress this point, 41.6, 27.9, 23.3 and 7.2% of the sampled farming households faced challenges of budgets deficit, children unbalanced diet, difficult cooking logistics and lack of time to cook respectively as some of the challenges being faced due to food insecurity.

This could be explained by the general poor living standard of the small scale farming households in the study area as they may unlikely be able to satisfy other basic needs for human survival in term of health, education, housing, transportation, among others. With regard to coping strategy adopted by the respondents, 52.5% skip meals, while 27.1% bought food on credit and very few of them (20.4%) reduce the quantity of their food per serving due to food shocks or insufficient resources. So, skipping meals per day became a major strategy to alleviate the challenges of food

insecurity (Abur, 2014).

Factors affecting food insecurity

A set of factors that associated with the probability of experiencing incidents of food insecurity include socio-economic factors (sex and household size), land ownership and income from the farm (Table 5).

The probability of experiencing food security was greater for households that had a family member with low household size. The coefficient of household size was negative but significant at 10% level, consistent with a priori expectation. The magnitude of the coefficient was -0.0332 which implied that household size was inversely related to household food security. A unit increase in household size may lead to 3.32% decrease in probability of the household being food secure.

This is in line with Mequanent et al., (2014) in their research on determinant of household food security among rural households of Southwest Ethiopia where household size was negatively correlated with household food security. This implied that larger household sizes were disposed to food insecurity than those households with smaller sizes (Tantu et al., 2017). The outcome of this finding seems logical because the family with larger the households' size tend to consume more food most especially where such households do not benefit from their family labour input to increase their farming production level provided that all other factors remain unchanged. This situation also usually arises when the family members are in their lower active age with attendant less productivity to influence food security components within the family.

In addition, the coefficient of sex was positive and statistically significant at 10% level. The marginal effect of sex variable was 0.145 which indicated that gender had a direct relationship with household food security. This result aligned with the findings of Twaha (2015) in Baga Catchment Forest in Lushoto district, Tanzania where sex had positive relationship with household food security. Though, based on the authors' a priori expectation, the probability of the households being food secure might be higher in male-headed farming households than the female-headed household

Table 4. Households' Food security

Variable	Frequency	Percentage
Main livelihood Source		
Farming	180	75.0
Purchase	51	21.2
Transfer income	9	3.8
Number of meals per day		
Once	38	15.8
Twice	125	52.1
Thrice	77	32.1
Food Shock Period		
January – March (1st Quarter)	60	25.0
April – June 2nd Quarter)	61	25.4
July – Sept (3rd Quarter)	14	5.8
Oct – Dec (4th Quarter)	105	43.8
Coping Strategy		
Skipping of meals	126	52.5
Meal quantity reduction	49	20.4
Food purchase on credit	65	27.1
Food insecurity Challenges		
Children unbalanced diet	67	27.9
Lack of time to cook	17	7.2
Budget deficit	100	41.6
Cooking logistics	56	23.3

Source: Field survey, 2019

as more men are likely to be involved in food production than women because male gender is customarily known to vend for the family livelihood in the study site.

Further, the probability of households being

Table 5. Factors affecting food security

Variable	Coefficient	Marginal Effect
Sex	0.5942 (0.3566)	0.1450** (0.0869)
Education (years)	0.3800 (0.3330)	0.3401 (0.2634)
Income	0.71228*** 0.0206	6.20e-07 (0.0000)
Group membership	0.3402 (0.8102)	16.8310 (0.2354)
Land ownership	2.0214** (0.0832)	0.2261** (0.0845)
Household size	-0.1424** (0.0580)	-0.332** (0.0527)
Farm size	0.4360 (0.4410)	0.3830 (0.8031)

Source: Field survey, 2019

(**) significant at 10%; (***) significant at 1%

food secure was higher for households who permanently owned the land than those who rented, leased or struggling to buy some hectares of land. The result of this study showed that land ownership had a coefficient of 0.226 and was statistically significant at 10% level. This implies that a unit increase in the size of land being owned leads to the probability of the household being food secure by 2.26%. This result is plausible because land is a productive asset that could be used for agricultural practices, agroforestry services and other livelihood activities which can not only boost the production frontier of the farming households but also serve as a another substantial source of income to attain food security.

Lastly, with regard to income of the respondents, the income variable is statistically significant at 1% level. This indicated that with a unit increase in respondents' income there will be reduction in the relative chance of the households being food insecure by 7.12%. This result thus supports the findings of Tantu et al., 2017 which showed that households with higher monthly income were less

likely to be food insecure than smaller income gainers.

Conclusion

This study examined the determinants of food security among small holders farming households in South-western zone of Nigeria. The study thus concluded that majority (75%) of the smallholder food crop farming households were earning their living primarily through farming but still remain food insecure. So, it was somehow difficult for them to adequately feed their families. They therefore adopted meal skipping strategy to cope with the food shortage upshot particularly during the farming off-season. Likewise, the probability of being food secure was greater among lower households' size farmers. Also, households who permanently owned the land tend to be more food secure than those who rented, leased or struggling to buy some hectares of land. Further, a unit increase in respondents' income will lead to reduction in the relative chance of the household being food insecure by 2.04%. In terms of households' food insecurity incidence, about 55% of the smallholders farming households in South-western Nigeria were below the food insecurity line meaning that only 45% of them were food secure. Therefore, every food insecure household would require about 8% increase in their spending in addition to their per capita income in order to be food secure. Lastly, about 5% of the smallholders farming households in the study area were severely food insecure.

Recommendations

The utmost recommendation of this paper to avoid repetition is that Government should as a matter of exigency overhaul the agricultural sector by encouraging the small holders' farmers who are the providers of food in Nigeria through: (i) increased budgetary allocation to farming system to reflect the significant importance that food security have for the well-being of all; (ii) provision of land by proffering solutions to the problems associated with land tenure system to encourage easy accessibility of land to small hold-

ers farmers in Nigeria; (iii) advance food policy and (iv) provision of micro-credit scheme to be targeted towards improving small scale farming system at a very friendly and sustainable terms and conditions.

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