



Determinants of Food Security among Forest-Based Households in Oyo State, Nigeria

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ABSTRACT: The growth of food insecurity kept increasing despite numerous policies and programmes geared towards improving the living standards of rural households in Nigeria. This study assessed the determinants of food security among forest-based households in Oyo state, Nigeria by obtaining data from 240 respondents with the aid of well-structured questionnaires and interview guide. Data obtained were subjected to descriptive statistics and logit regression model. The result of the descriptive statistics showed that the mean age of the respondents was ± 42 , about 65% of the respondents were female while 60% were married and about 43% had primary education. Also, the results revealed that most respondents (67%) produced food by themselves, 65% of them took two square meals per day and 70% skip meals as a coping strategy due to insufficient food. Furthermore, logistic regression model reveals that sex, household size, household's head income and land ownership have significant effects on rural household food security in the study area. The study thus recommends that food stabilization and creation of job opportunities such as crafting and agro- allied activities should be given a desired attention in the rural area.

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Food security is a condition best described as access by all of adequate and nutritious diet to maintain a healthy living. According to Food and Agricultural Organisation (FAO) (2002), food security can be defined as ensuring that all people at all times have both physical and economic access to enough food for an active and healthy life. Omonona and Agoi (2007), defined household food security as a condition in which all members of a household have access to sufficient food either by producing it themselves or by generating sufficient income to demand for it. A sustainable diet is the one that is protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable, nutritionally adequate, safe and healthy is very paramount to the food security status of any household Burlingame and Dernini (2012).

In addition, the ability of a household to produce and or purchase the food needed by all household members to meet their dietary requirements and food preferences, as well as assets and services necessary to achieve and maintain an optimal nutritional level is referred to as food security Oliver and Clemens (2012). This implies that the possession of a productive assets or services is very crucial for

household maintenance. A forest is simply a community of plants (vegetation) that is dominated by trees and forest resources. These resources are critical for the sustenance of the people. The major product that can be harvested or extracted from the forest is timber, while every other thing remains minor products. Therefore, non-timber forest products are sometimes referred to as minor products. Non timber forest products are goods of biological origin other than timber derived from the forest, other wooded land and trees outside forest Non Wood News (NWN, 2000).

Besides, forests contribute greatly to the diets of rural dwellers and of many people who live far from the forest. Forest fruits, nuts, berries, for instance are popular with rural as well as urban consumers. These and many other forest foods add variety and flavour to the diets while providing essential vitamins, minerals, fats and proteins. During the time of seasonal food shortage or unexpected emergencies for example drought, floods or wars, forest foods offer insurance against malnutrition and famine Termonte *et al.*, (2013). Leaves –used for stews and soups, mushrooms are the most common forest foods Albert and

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Emmanuel (2011). Livelihoods of the rural people of Oyo State depend on agriculture.

However, erratic nature of rain and prevalence of drought in the country make agricultural production a challenge. Forest and trees are becoming scarce, thus resulting in a state of imbalance between what rural households need and what they can obtain. Therefore, the objective of this study is to evaluate the determinants of food security among forest – based households in Oyo state, Nigeria.

METHODS AND MATERIALS

The study area: The study was carried out in Oyo State. It 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 state official website).Oyo State covers approximately an area of 28,454 square kilometers and is ranked 14th by size. The landscape consists of old hard rocks and dome shaped hills, which rise gently from about 500 meters in the southern part and reaching a height of about 1,219 metre above sea level in the northern part. Some principal rivers such as Ogun, Oba, Oyan, Otin, Ofiki, Sasa, Oni, Erinle and Osun River originate in this highland. The population of Oyo state according to a recent estimate from the National Population Commission (2006) is 5,591,589 Million. The climate and soil of the state are suitable for the cultivation of a wide range of crops. The major food crops include maize, yam, cassava, millet, rice and banana, while cash crops include cocoa, kolanut, cotton e t c.

The Climate is equatorial, notably with dry and wet seasons with relatively high humidity. The dry season lasts from November to March while the wet season starts from April and ends in October. Average daily temperature ranges between 25 °C (77.0 °F) and 35 °C (95.0 °F), almost throughout the year. Some people engage in agriculture while some engage in civil service and trading (Oyo state official website).

Sampling Procedure and Sample size: Primary data was used for this study and the data was collected with the aid of a well-structured questionnaire / interview guide. Data was collected from two hundred and forty (240) household heads through a multistage sampling method. The first method involved a purposive selection of three agricultural development program (ADP) zones and these were Ibadan/Ibarapa, Oyo and Saki ADP zones. In the second stage, another purposive selection was carried out in each of the above ADP zones as follows: two local government areas (LGAs) from Oyo ADP zone and three local

government areas (LGAs) from both Ibadan/Ibarapa and Saki zones totaling eight local government areas. This selection was due to presence of forest areas located around those zones. In the third stage, two villages were randomly selected from each of the eight local government areas to make sixteen villages. The last stage was the random selection of sixty (60) respondents from Ibadan/Ibarapa zone, ninety six (96) from Saki zone and eighty four (84) respondents from Oyo agricultural zone.

Model specification: 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 rural households of southwest Ethiopia. The logit model postulates that the probability (Pi) of being food secure is a function of an index (Zi), where (Zi) is an inverse of the standard logistic cumulative function of Pi i.e.

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

$$1 - P_i = \frac{1}{1 + e^{-z_i}}$$

Then, the equation above can be expressed as:

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{z_i}}{1 + e^{-z}} = e^{z_i}$$

Taking the natural log of the equation;

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

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

The explicit form of the equation is given by

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

Where Y = food security / food insecure; α = coefficient of explanatory variables; X = vector of independent variables; X₁ = age; X₂ = sex; X₃ = household size; X₄ = marital status; X₅ = land ownership; X₆ = educational level; X₇ = income; X₈ = distance of home to the forest

The Foster Greer and Thorbeck 1984 (FGT) index as used by Mequanent *et al.* (2014) to estimate the food security status for their study was employed to estimate the food insecurity status of this study. The general formula of FGT index is given by:

$$P\alpha = 1/n \sum_{i=1}^q \left[\frac{z-y_i}{z} \right] \alpha \dots \dots \dots (3)$$

Where Z is the 2/3 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

$$z = \frac{PC}{MPC}$$

Where PC = per capita food expenditure of ith household and MPC = 2/3 mean per capita food expenditure of all households.

Where F_i = food security index; When $F_i \geq 1$ = food secure ith household and $F_i \leq 1$ = food ith insecurity household

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents:

Sex of the respondents showed that 65.4% of the respondents were female while 34.6% were male. This implies that gathering and collection of non-timber forest products (NTFPs) is more of a female activity. This conformed with the findings of Jimoh and Haruna (2007), which showed that 63% of their respondents were female who engaged in gathering and marketing of NTFPs. **Age** of the respondents revealed that majority (38.3%) of the respondents fell within the age range of 31 to 40 years while only 6.7% were above sixty years (>60). The mean age was ± 42 years which clearly indicates that most of the respondents were in their active age, young and have sufficient energy to execute the task of gathering NTFPs at any given time and space. This finding corroborates the findings of Famuyide *et al.*, (2013) in which 67% of the respondents were of the age bracket 31-50. Marital status of the respondents showed that 5% of the respondents were single, 60% were married, 10% were divorced, 23% were widowed and only 2% of the respondents were separated. This result corroborates the findings of Amusa and Jimoh (2012), where 75% of the respondents were reported to be married. Furthermore, educational level of the respondents showed that about 43% of the respondents had primary education, 33.0% had no formal education, 17.5% went through secondary education level, 4% had tertiary education and about 3% had adult education. This result is an indication that there is a good literacy level in the study area. It thus conformed to the

findings of Ayanwuyi (2013), who posited that 45% of the respondents went through primary education level. In terms of primary occupation of the respondents, the study revealed that about 53.0% of the respondents were farmers while trading and civil service accounted for 30.0% and 17.1% respectively. It can be inferred that majority of the respondents engaged in farming alongside with gathering and collection of NTFPs in order to boost food provision for their households.

Table 1: Socio- economic characteristics

Socio – economic	Frequency	Percent
Gender		
Male	83	34.6
Female	157	65.4
Age		
<=30	30	12.5
31-40	92	38.3
41-50	68	28.3
51-60	34	14.2
Above 60	16	6.7
Mean = 42		
Marital status		
Single	13	5.4
Married	145	60.4
Divorce	23	9.6
Widow/widower	54	22.5
Separated	5	2.1
Household size		
<= 5	129	53.8
6-10	105	43.7
Above 10	6	2.5
Mean = 5		
Level of education		
Non formal education	79	32.9
Primary	102	42.5
Secondary	42	17.5
Tertiary	9	3.8
Adult education	8	3.3
Primary occupation		
Farming	127	52.9
Trading	72	30.0
Civil service	41	17.1

Source: data analysis, 2019.

This result negates the findings of Famuyide *et al.*, (2013) where only 6.3% of the respondents were reported to be farmers. As regard to the household size of the respondents, 54% accounted for respondents whose household size were less than or equal to 5 members, while 44% and 2.5% accounted for those whose household size fell between 6 and 10 members and above 10 respectively. The mean household size was 5 members. This implies that the respondents had relatively small household size. This is in line with Mulenga *et al.*, (2011) on their research work on contribution of NTFPs to rural households in Zambia where 5.8 was reported as the mean household size of their respondents.

Food Security situation of the sampled households:

Source of food to the respondents showed that majority (66.7%) of the respondents produced food by

themselves, 30.8% bought their food and only 2.5% obtained their food through gift. It can be inferred that majority of the respondents were peasant farmers producing food for their households with little or no surplus for sale. This result corroborates with the findings of Twaha (2015), where 42.5% of the respondents obtained food through self-production. Number of meals taken per day revealed that majority (65%) of the respondents took two meals per day, 27.5% had three square meals, and 7.5% took a meal per day. This implies that majority of the respondents skip a meal due to insufficient food. Time of food shortage showed majority (65.7%) of the respondents declared that they found it difficult to feed their families around January to April period, 28.0% claimed May to August and very few of them (6.3%) maintained September to December. This indicates that majority of the respondents found it difficult to feed their families during the pre-harvest period.

Table 2: Food security

Variable	Frequency	Percentage
Source of food		
Self – production	160	66.7
Purchase	74	30.8
Gift	6	2.5
Number of meals per day		
One	18	7.5
Two	156	65.0
Three	66	27.5
Period of the year		
January – April	157	65.4
May – August	67	27.9
September – December	16	6.7
Food Challenge		
Finding food for the children	69	28.7
Finding time to cook	15	6.3
Finding affordable food that fits my budget	107	44.6
Finding easy to cook food	49	20.4
Coping Strategy		
Skip meal	168	70.0
Meal size reduction	7	2.9
Buying food on credit	65	27.1

Source: data analysis, 2019.

Food challenge experienced by the respondents revealed that majority (45%) of the respondents experienced a challenge in finding affordable food that fit their budgets, 29% of the respondents experienced finding food for the children as a challenge, 20% experienced finding easy to cook food and very few of the respondents (6%) had finding time to cook as a challenge. Coping strategy adopted by the respondents showed that 70.0% of the respondents skip meals, while 27% bought food on credit and very few of them (2.9%) reduce their meal sizes. It indicates that majority of the respondents skip meals due to food shocks or insufficient resources. This result goes with the findings of Abur (2014), who reported that 57.5%

of his respondents skip meals as a coping strategy in the study area.

Marginal effect of factors affecting food insecurity

Household size: The coefficient of household size was negative but significant at 1% level, consistent with *a priori* expectation. The magnitude of the coefficient was -0.332 which implied that household size was inversely related to household food security. A unit increase in household size leads 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.

Land ownership: had a coefficient of 0.226 and was statistically significant at 1% level. The magnitude of the coefficient was 0.226, an indication that a unit increase in the size of land leads to the probability of the household being food secure by 2.26%. This result explain the fact that land being a productive asset could be used for agricultural practices, agroforestry services and other livelihood activities which can serve as a source of income to obtain food.

Sex: The coefficient of sex was positive and statistically significant at 10% level. The magnitude of the coefficient was 0.146 which indicated that gender had a direct relationship with household food security. The probability of the household being food secure by 1.46% increases as more men were involved in food production. This result aligned with the findings of Twaha (2016), in his research on assessment of contribution of NTFPs to food security and income around baba catchment forest in Lushoto district, Tanzania where sex had positive relationship with household food security.

The odd ratio of factors affecting food insecurity status of the respondents: Sex: Additional male - headed households are more likely to decrease the relative probability of being food insecure compared to food secure by 59.4%. This might be as a result of lower rate of dependency observed in female headed households.

Household size: This significantly increased the relative chance of food insecure of rural households compared to food secure by 75.9%. This implied that larger household sizes were relatively less likely to be food insecure than smaller households. This aligns the findings of Tantu *et al.*, (2017) which revealed that households with > 2 members were three times more

likely to be food insecure than households with < 2 dependent members.

Income: Income of the respondents significantly increased the relative chance of rural household being food secure compared to food insecure by 2.04. This indicated that with a unit increase in respondents' income there will be reduction in the relative chance of the household being food insecure by 2.04. This result strongly 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.

Land ownership: Table 3 also showed that respondents that owned land were more likely to be food secure than their counterparts without land. A unit increase in the size of land owned led to 7.55 increase in the relative probability of being food secure.

Table 3: Factors affecting the food insecurity status of households

Variable	Coefficient	Std error	MF _X	Std error	Odds ratio	Std error
Age	-0.0452091	0.0407565	0.001537	0.00401	0.9557976	0.0389549
Sex	0.5942451*	0.3565763	0.1459141*	0.08686	0.4057549*	0.242967
Marital status	1.006055	1.333979	-0.046282	0.09008	2.734792	3.648154
Education	0.0224926	0.0989897	-0.01434408	0.01273	1.022747	0.1012415
Household size	-1.421694**	0.5807525	-0.3325656***	0.0527	0.2413048**	0.1401384
Land ownership	2.021365**	0.8329203	0.2260555***	0.08445	7.54862**	6.287399
Income	0.7122772***	0.2059532	8.21e-06	0.00001	2.038628***	0.4198621
Distance from forest	-0.0000385	0.0000274	-0.0042874	0.2178	0.9999615	0.0000274

Source: Data analysis, 2019.

Extent of food insecurity: Table 4 revealed the food insecurity incidence, gap (depth) and severity. This was computed using FGT food insecurity index. The total per capita household expenditure was ₦1,958,194.8 and the mean per capita household expenditure was computed as ₦8159.145. Food insecurity line which is the 2/3 of the mean per capita household expenditure was ₦5439.43. However, 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 above or equal amount in the food insecurity line is described as food secure.

The result showed that the head count ratio or food insecurity incidence (F₀) was 0.55. This implied that 55% of the respondents in the study area were below the food insecurity line and only 45% of the total respondents were food secure. The food insecurity depth (gap) (F₁) was 0.08, this indicated that each food insecure household need about 8% increase in their spending besides their per capita income. The food insecurity severity (F₂) was 0.02, this is measured as weighted average of the square distance below the food insecurity line (minimum requirement). The result implied that exactly 2% of the respondents were mostly food insecure in the study area. This goes in line with Mequanent *et al.*, (2014) where 42.9% was recorded as the incidence of food insecurity.

Table 4: Extent of food insecurity

Parameters	Estimate
Incidence of food insecurity (F ₀)	0.55
Depth of food insecurity (F ₁)	0.08
Severity of food insecurity (F ₂)	0.02

Source: Data analysis, 2019.

Conclusion: This study examined the determinants of food security among forest-based households in Oyo state. It could be concluded that forest – based households depend on gathering and collection of non-timber forest products (NTFPs) alongside with farming for their subsistence. Also, land possession as a productive asset could be used for practicing various agroforestry systems such as agro silvopastoral system where people get crops, trees (firewood), get fodder and meat or milk from animals and manure, therefore reduce the dependence of NTFPs from the forest for various products.

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