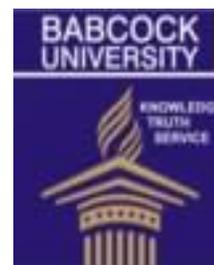




Available online @ www.actasatech.com

acta SATECH 11 (1): 53 – 61 (2019)



Determinants of food security status among maize-based farming households in Ogun State, Nigeria

Akinwole O.T.¹, Balogun O.L.¹, Abasilim C.F.²

¹ Department of Agriculture & Industrial Technology, Babcock University, Ilisan-Remo, Ogun State

² Department of Agricultural Technology, Yaba College of Technology, Yaba, Lagos State

Corresponding author < deleakinwole@gmail.com >

Abstract

Effective management of available resources through an efficient resource allocation pattern will enable a farming household to get as much income as possible from its production and consequently improve its economic access to food required by its members. The study examined determinants of food security status among maize-based farming households in Ogun State, Nigeria. Using a well-structured questionnaire, multi-stage sampling procedure was employed to collect data from one hundred and five maize-based farming households. The analytical tools employed include; Descriptive statistics, Foster-Greer-Thorbecke (FGT), Probit regression model. The study revealed that 61.9% of the households were food secure and results showed that the mean per capita food expenditure of the farmers stood at ₦11,924.24. The study also revealed that the significant factors affecting food security status of the farmers include sex of household heads, farm size, age of household head, household size and hired labour ($p < 0.01$). Based on these findings, the study recommends incentives that make farming attractive to the youth and government policies that ensure that food production is not affected by farm labour supply in order to increase food security.

Keywords: Efficient resource allocation, Farm labour, Foster Greer-Thorbecke. Multi-stage sampling

Introduction

Agriculture is seen as an important tool and vehicle for reducing the effect of household food insecurity, unemployment and poverty (Moore, 2000). The United Nations reported that more than one billion people in the world are hungry; six million of the number are children and 17, 000 of them die every day (UN Food Security Report, 2013). Food and Agriculture Organization also reported that nearly one billion people worldwide are estimated to be undernourished, of which developing nations account for 98% (FAO, 2010). Nigeria agricultural production is highly dominated by peasant farmers, characterized by limited access to credit facilities and modern technology farm inputs. These farmers however are responsible for about 95% of total agricultural output (Salau, 2013). Farming plays an important role in the livelihoods of developing countries (Nigeria inclusive) as more than 85% of rural households are actively involved (Jatta, 2013). Staple food production in many agriculture-based countries is largely rain fed and experiences large fluctuations caused by climatic variability and decline in domestic production, which consequently raise a potential problem of food availability at the national level.

Maize is the most widely-grown staple food crop in sub-Saharan Africa (SSA) occupying more than 33 million hectares each year (FAOSTAT, 2015). The crop covers nearly 17% of the estimated 200 million hectares cultivated land in SSA, and is produced in diverse production environments and consumed by people with varying food preferences and socio-economic strata. Maize ranks high as a major staple food particularly for the low income earners and resource poor farm households in developing economies of SSA (FAO, 2009). It serves over 200 million Africans as source of energy and it has comparative production advantage over other staples (Bamidele *et al.*, 2008). It is an important source of carbohydrate, protein, iron, vitamin B, and minerals. Furthermore, Green maize (fresh on the cob) is eaten parched, baked, roasted or boiled; playing an important role in filling the hunger gap after the dry season and serving as a staple diet for over 200 million people. It accounts for about 43% of calorie intake in Nigerian's diet and has consumption quantity of 53.20 g/capital/day (Nweke *et al.*, 1983; FAOSTAT, 2007).

According to Nmadu (2015), Nigeria's deficient food situation has been worsened by declining farm productivity owing to inefficient production techniques, poor resource base and insufficient farm

labour amongst others. Dalhberg (2010) identified four global threats that have significant implications for the food security. They are: population explosion (humans, cars and livestock), global warming, and threat of poverty and globalization. Central Bank of Nigeria in 2010 reported that the 2.5% per annum increase in food production in the country does not keep pace with 2.8% population growth rate per annum. Availability of food is therefore being achieved through production, domestic food stocks, commercial food imports or food aid, purchasing power, financial outlays or access to the necessary resources (Kennedy and Haddad, 1992).

Food and Agriculture Organization (2002) describes a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life as food security. However, achieving food security still remains an indeterminate challenge due to the global approach being employed instead of formulating and applying solutions based on specific locations with an understanding of the social system and livelihood system (FAO, 2003). This study therefore investigated the determinants of food security status among maize-based farming households in Ogun State, Nigeria.

Theoretical/conceptual framework and literature review

Food Security is defined as access to sufficient food. Food security is achieved 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. Food security has long been used as an important macro-level indicator of agricultural stability and progress for both agricultural and economic researchers (Nord and Hopwood, 2007). Food security as a concept integrates environmental, economic, and cultural factors in a manner that can provide useful tools for predicting dietary patterns within the household.

Studies (Sanusi and Salimonu 2006; Ibok, *et al.*, 2014) have examined agricultural production and food security in different areas in Nigeria and their results showed that productivity of households had significant and positive effect on household's food security status. This implies that the higher the productivity of resources employed, the higher the probability that such households would be food secure. Omotesho *et al.* (2014) examined the relationship between hired labour use and food

security among rural farming households in Kwara State, Nigeria which revealed that farming income of the farm family was significantly enhanced by the quality of hired labour used. Ukoha (2013) however examined the determinants of food security in female-headed households involved in individual tenure system in Abia State which revealed that farm income, farm size, farming experience, membership of co-operative organization, access to credit, extension contact and extent of commercialization were the factors affecting food security in the area. In contrast, Agboola (2013) estimated food insecurity index and examined the factors that influences food insecurity among small farmers in Osun State, Nigeria. The study revealed that food insecurity among the households was influenced by agricultural production input (labour use inclusive).

Materials and methods

This study was carried out in Ogun state. The state, which has its capital as Abeokuta comprises of 20 Local Government Areas (LGAs) and overall total population of 3,728,098 (NPC, 2006). It is located in the tropical rainforest belt within latitude 6°N and 8°N and longitude 2°E and 15°E. The state shares an international boundary with the Republic of Benin to the west and interstate boundaries with Ondo State in the east, Lagos State and Atlantic Ocean in the south and Oyo State in the North. It enjoys tropical climate and double maxima of rainfall from April-July and September- October. Average temperature is about 32°c and humidity can be as high as 95% in the area. The people are predominantly farmers, who engage in small scale, peasant farming. The major food crop in the area includes maize, cassava, yam, cocoyam, plantain and vegetables among others.

A multi-stage sampling procedure was employed in the selection of the respondents. The first stage involved the random selection of two Agricultural Development Project zones (ADPZ) in the state. In the second stage, two local government areas (LGAs) were purposively selected from each of these ADPZ. The next stage of the sampling involved the simple random selection of three villages from each of the LGA. At the last stage, ten maize farmers were randomly selected from each of the villages for interview. In all, a total of one hundred and twenty that were interviewed. However, only one hundred and five maize (105) maize-based crop farmers gave complete information that was used for the analysis. This study employed descriptive statistics (such as tables, frequencies, mean and percentages), food security measures and probit model.

(i) Descriptive: Descriptive statistics which shows the frequency, mean, standard deviation and percentage were used to describe the socio-economic characteristics of the maize-based farmers. (ii) Food security measures: Food security status of the rural maize farming households were classified using the food security index as employed by (Hasan and Badu 1991, Yusuf *et al.* 2015).

Mean per capita household food expenditure (MPCHHFE) is given as:

$$\frac{\text{Total per capita household food expenditure}}{\text{Total number of households}}$$

The food security lines are calculated based on the mean per capita household food expenditure (MPCHHFE). Within the food secure households, those that spend less than one-third (1/3) of the MPCHHFE are classified as core food secure while those that spend less than two-third (2/3) of MPCHHFE are classified as moderately food secure. The Foster Greer-Thorbecke (FGT) weighted poverty measure was adopted for quantitative food security assessment. The decomposition was based on several socioeconomic characteristics of households.

The FGT index is given mathematically as

$$P\alpha = \frac{1}{N} \sum_{i=1}^q \frac{(z - Y_i)}{z} \quad \alpha \geq 0 \quad (1)$$

Where

Y_i = per capita household food expenditure

($i = 1, 2, \dots, q$)

Z = Food security index

N = Total number of population

q = Number of food secure households

$P\alpha$ = Weighted food security index, $\alpha \geq 0$ and it can take values of 0, 1 and 2

Where,

$\alpha = 0$, the FGT index P_0 measures food security incidence. This represents the proportion of the households that are food secure, i.e. the proportion of households that fall below the food security threshold (line).

$\alpha = 1$, the FGT index P_1 measures the food security depth of the households. This denotes the proportion of food security line that the food secure household will require to get out of food insecurity.

When $\alpha = 2$, the FGT index P_2 measures the severity of food security status. It measures how far away the food secure households are from the food security line.

Therefore,

Food insecure = household whose per capita food expenditure falls below two-third of the mean.

Food secure = household whose per capita monthly food expenditure falls above or is equal to two third of the mean per capita food expenditure.

(iii) Probit Model: The study employed probit model to determine factors affecting food security status of the maize-based farming households in the study area. The model is specified as follows:

$$Y = \beta_0 + \beta_i X_i + \varepsilon_i \quad (2)$$

Where $\varepsilon = N(0, 1)$.

Y= is the dependent variable (dichotomous variable) which assumes the value 0 if household is food insecure and 1 if the household is food secure.

β_0 = intercept

$\beta_i X_i$ = slope (coefficient) of independent variables

Independent variables (the explanatory variables) X;

where $X_i = X_1, X_2, \dots, X_{10}$ are:

X_1 = Sex of farmer (male=1, female=0);

X_2 = Marital status of farmer (married=1, 0 otherwise)

X_3 = Membership of cooperative (Yes=1, No= 0)

X_4 = Years spent in school (Years)

X_5 = Farm size (Hectare)

X_6 = Age of farmer (Year);

X_7 = Years of experience in farming (Years)

X_8 = Household size (continuous)

X_9 = Family labour (man-days);

X_{10} = Hired labour (man-days)

Results and discussions

Socioeconomic characteristics and farm specifics of respondents is presented in Table 1.

The result shows that about 72 percent of the maize-based farmers were males and about 87 percent of them were in the active age bracket of between 16 and 60 years as evidenced from Ringe-Metzenger and Diehl (1993). The study further revealed that majority (92.4%) of the maize farmers were married and had mean household size of 5.2 persons hence; farm labour was available for agricultural production which could in turn increased productivity and food security status of the households. This study is

therefore in agreement with Yusuf *et al.* (2015) that rural faming households in Nigeria have large family size and hence availability of farm labour at all times will augment the hired labour needs for production and has the tendency to make household food secure. About 80% of the respondents were literate. With regards to access to extension service, 88.6% of the maize farmers did not have access. Membership of farmers' cooperatives of the respondents, reveals that majority (69.5%) were members of farmers' cooperatives while about half of the farmers (51%) had farms that were less than one hectare. The mean farm size was 0.83 ± 0.007 hectare.

The food security profile of maize-based farmers is shown in Table 2. The mean per capita household food expenditure stood at ₦11,924.24. The food security line i.e., 2/3 of the mean per capita household food expenditure stood at ₦7,949.49. The core food security line (which 1/3) of the mean per capita household food expenditure stood ₦3,974.74. The result revealed that about 62% of the farmers were food secure.

Profile of food security and some socio-economic characteristics of maize-based farmers is presented in Table 3. Gender of the maize-based farmers revealed that male-headed maize farming households had a higher incidence of food insecurity than the female. However, food security depth and severity indices follow the same trend. The results also showed that maize-based farming households whose heads were older than 60 years had the lowest incidence, depth and severity of food security. The implication is that household heads within this age group are at their low economic active age and are consequently expected to be less food secure than those in other younger age groups. The study also revealed that married farmers had higher incidence of food security than those that are single, divorced or separated. The same pattern was observed for food security depth and severity respectively. Incidence of food insecurity was observed to be more pronounced among the maize-based farmers with no formal education than literate farmers. Food security depth and severity followed the same trend. Maize-based farmers with household size with 1-3 persons had incidence of food security than those with more members. However, the pattern observed for food security depth and severity respectively did not follow a definite trend. Based on primary occupation, maize-based farmers who are primarily engaged in other occupation were found to be more food secure than their counterparts who are basically into farming.

Table 4 presents the determinants of food security status of maize-based farmers using the probit regression model. The likelihood ratio statistics as indicated by χ^2 statistics is 49.202 which is highly significant ($p < 0.01$). The coefficient of determination stood at 0.3666, which implies that the explanatory variables account for only 36.6% variation in food security status, hence, the remaining unexplained variation were not captured by the model. The results showed that sex, farm size, age of household head,

household size and hired labour significantly impacted food security status of the maize-based farmers.

Culturally, men are saddled with the responsibilities of providing food for their household members; hence more effort is put in their farm work so as to make food available at all time for the family. Farm size coefficient has a positive sign and was significant at 5% level.

Table 1: Socio-economic characteristics and farm specifics of respondents

Household characteristics	Frequency	Percentage	Mean	SD
<i>Sex</i>				
Male	75	72.4		
Female	30	27.6		
Total	105	100.0		
<i>Age (years)</i>				
16 – 30	4	3.8		
31 – 40	16	15.2		
41 – 50	56	53.3		
51 – 60	15	14.3		
> 60	14	13.3		
Total	105	100.0	34.7	8.9
<i>Primary occupation</i>				
Farming	99	94.3		
Otherwise	6	5.7		
Total	105	100.0		
<i>Marital status</i>				
Married	97	92.4		
Single	3	2.9		
Widowed	2	1.9		
Divorced	3	2.9		
Total	105	100.0		
<i>Household size (person)</i>				
1-3	3	2.9		
4-8	99	94.3		
>8	3	2.9		
Total	105	100.0	5.2	1.2
<i>Educational level</i>				
No formal education	21	20.0		
Primary education	58	55.2		
Secondary education	21	20.0		
Tertiary education	5	4.8		
Total	105	100.0		
<i>Farm size (hectare)</i>				
0.10 - < 0.5	5	51.4		
0.5 - < 1.0	72	42.9		
1.0 - < 2	20	5.7		
2.0 - < 3	8			
Total	105	100.0	0.83	0.009

Source: Field survey, 2017

Table 2: Food security profile of maize farmers in the study area

Calculation of food security status	Value
Total household size	105
Mean per capita household food expenditure(MPCHHFE)	₦11,924.24
Food security line (i.e. 2/3 of MPCHHFE)	₦7,949.49
Moderate food secure line (i.e. > 1/3 of MPCHHFE)	>₦7,949.49
Core food security line (i.e. 1/3 of MPCHHFE)	₦3,974.74
Food Secure	61.9%
Food Unsecure	38.1%

Source: Field survey, 2017

Table 3: Selected socio-economic characteristics and food security status of maize farmers

Variable	Food security status		
	P ₀	P ₁	P ₂
<i>Sex</i>			
Male	0.721	0.111	0.204
Female	0.333	0.103	0.015
<i>Age (years)</i>			
< 30	0.444	0.021	0.000
31-40	0.702	0.202	0.022
41-50	0.812	0.334	0.031
51-60	0.333	0.119	0.127
> 60	0.254	0.211	0.032
<i>Marital status</i>			
Married	0.560	0.224	0.051
Single	0.312	0.105	0.011
Divorced	0.211	0.153	0.010
Widowed	0.100	0.139	0.010
<i>Level of education</i>			
No formal education	0.111	0.000	0.001
Primary education	0.442	0.082	0.022
Secondary education	0.521	0.091	0.035
Tertiary education	0.540	0.100	0.042
<i>Household size (person)</i>			
1-3	0.862	0.331	0.142
4-8	0.323	0.071	0.051

>8	0.014	0.000	0.011
<i>Primary occupation</i>			
Farming	0.211	0.000	0.001
Otherwise	0.777	0.111	0.000

P₀, P₁ and P₂ represent poverty incidence, depth and severity respectively.

Source: Field survey, 2017.

The result showed that a hectare increase in farm size of maize-based farmers increased the probability of food security by 0.8%. This indicates that the larger the farm size grown with maize, the higher is the probability that the household would be food secure. experience. This will in turn improve household's production capacity and therefore increase the likelihood of maize farmer household's food security. This result is in agreement with the findings of Ibok *et al* (2014) that increase in farmer's age is a boost to his exposure and his productivity and chances of food security.

In the case of household size, an additional number of persons in farming households increased probability of food insecurity by 0.4%. The

This attests to the fact that high productivity of maize farming is a function of farmer's income and significantly contributes to increased food security. However, age of household head increased the probability of food security by 0.09%. An additional year to the farmer's age means increase in farming implication is that, household size increases the number of people depleting the available resources, particularly households with high dependency ratio are particularly prone to food insecurity. However, the use of hired labour by maize farming households reduced their food security by 0.04%. The implication is that the profit of farmer is reduced as a result of increased expenditure from hiring labour to work on his/her farms.

Table 4: Factors influencing the food security status of maize-based farmers

Variables	Marginal Effects	Standard Error	T-ratio
Sex of household head	0.040807***	0.06094	3.33
Marital status	0.073961	0.85567	0.82
Membership of cooperative	-0.12208	0.67599	-1.30
Years of schooling	-0.0066203	0.05877	-0.68
Farm size	0.0078977**	0.1299	2.17
Age of household head	0.00092857**	0.04511	2.16
Years of experience	-0.0013243	0.04217	-0.96
Household size	-0.0037980***	0.26616	-4.09
Family labour	0.018936	0.6280	0.96
Hired labour	0.003514***	0.0555	-3.40
Constant	0.555555	1.5331	0.94
Pseudo R ² = 0.3633			
Prob > Chi ² = 0.0000			
Log-likelihood = -49.202			

Source: Field survey, 2017

*, **, *** imply significance at 10%, 5% and 1% respectively

Conclusion and policy recommendations

The question of whether agriculture makes economic sense is rhetorical. It depends on the extent to which it provides food for the food insecure at a lower opportunity cost in the use of their resources than alternative means of procuring that food. The study examined the determinants of food security among maize-based farming households in Ogun state, Nigeria. The results revealed that the maize-based farmers were young with large family size. Most of the farmers were literate and had farm size of less than 1hectare. The result indicated that the mean per capita food expenditure of the maize-based farmers was ₦11,924.24; with about 70% of them being food secure. The significant factors that influenced food security status of the farmers were sex of farmer, farm size, age of farmer, household size and hired labour. Based on these findings, the study recommends the following:

1. Incentives that make farming attractive to the youth should be provided.
2. Awareness creation on family planning will go a long way in reducing household size of the rural farming household size since there is tendency of being food insecure with large household size.
3. Governments and Non-Governmental Organizations should encourage youths to go into farming so as to boost food production.

References

Agbola, P.O. (2013); Factors influencing Food Security among Small Farmers in Nigeria. *African Journal of Agricultural Research*. 9(27): 2104-2110.

Bamidele, F.S., Babatunde, R.O. and Rasheed, A. (2008). Productivity Analysis of Cassava-Based Production Systems in the Guinea Savannah: Case Study of Kwara State, Nigeria.

American-Eurasian Journal of Scientific Research 3(1): 33-39.

Dalhberg, K.A. (2010). The Global Threat to Food Security. *Urban Agriculture*. Winter, 5(3):203-217.

FAO, (2000). Food and agricultural organization of the United Nations. The state of food and agriculture, Rome, Italy.

FAO (2002): The state of food insecurity in the world 2001. Rome, Italy.

FAO (2003): Contribution of farm power to smallholder livelihood in Sub-Saharan Africa. <http://www.fao.org/docrep/009/a0229e/a0229e05.htm>.

Nord, M and Hopwood, H. (2007): "Recent Advances Provide Improved Tools for Measuring Children's Food Security". *Nutr*. 137: 533- 536.

Ibok, W., Idiong, C., Bassey, N.E. & Udoh, E. (2014); Food Security and Productivity of Urban Food Crop Farming Households in Southern Nigeria. *Journal of Agricultural Science*, 2(3): 1-12.

Jatta, S. (2013). Urban agriculture, price volatility, drought and food security in developing countries. *Munich Personal RePEc Archive MPRA Paper No. 46544* <http://mpa.ub.uni-muenchen.de/46544/> accessed 20/12/17

Kennedy, E & Haddad, L (1992) Food security and Nutrition 1871-1881): Lessons learned and future priorities, *Food Policy* 17(1):2-6

Moore, L.J. (2000): Shoreline mapping techniques. *Journal of Coastal Research* 16(1):111-124.

Nmadu, J.N. (2015); Farm Labour Supply and Utilization for Food Crop Production in Nigeria.

Proceedings from 2nd International Conference on Education and Social Sciences. Istanbul, Turkey. 2-4th February.

Nweke, F. I and Akorha J. A. Akorha (1983). 'Determinants of adoption of New Technology Among Smallholders and implementation for Administration of transfer programmes.' A Case Study of Rice Production of Plateau State of Nigeria. *Agricultural Administration*. 12: 17-19

Omotesho, K.F, A. Muhammad-Lawal and D. E. Ismaila (2014): Assessment of hired labor use and food security among rural farming households in Kwara state, Nigeria, *Journal*

- of Agricultural Sciences, vol. 59, No. 3: 353-361.
- Ringe-Metzger, A. and Diehl, L. (1993). Farm household systems in Northern Ghana: A case study in farming system-oriented research for the development of improved crop production systems.
- Nyankpala Agricultural Report No. 9, 1993. Nyankpala, Ghana. 249 pp.
- Salau S.A (2013) Determinants Of Technical Inefficiency Among Maize-Based Farming Households In Niger State, Nigeria Ethiopian Journal of Environmental Studies and Management Vol. 6 No.5 2013 543-550
- Sanusi, W.A. and Salimonu, K.K. (2006); Food Security among Households: Evidence from Yam Production Economics in Oyo State, Nigeria. *Agricultural Journal*, 1(4): 249-253.
- Ukoha, H. (2013): Determinants of Food Security in Female Headed Households involved in Individual Tenure System in Abia State, Nigeria. *Global Journal of Agricultural Research*, 1(2):48-57.
- Yusuf, S.A, Balogun ,O. L. and O.E. Falegbe (2015) Effects of urban household farming on food security status in Ibadan Metroplis, Oyo state, Nigeria, *Journal of Agricultural Sciences*, Vol. 60, No. 1: 61-75.