Food Security Status of Small-Scale Farmers in Nasarawa State, Nigeria

Simpa, Ondeku James

Department of Agricultural Technology the Federal Polytechnic, Nasarawa, Nigeria

Email: jamessimpa2014@gmail.com
GSM No: 08066316605

Abstract
This study examined the factors influencing the food security status of Nigerian small-scale farmers using Nasarawa State as a case study. Structured questionnaire and a multi-stage random sampling technique were used in collecting data from 100 respondents from four villages in two Local Government Areas of Nasarawa State. Logit model was used to analyse the data. The results showed that about forty-three percent (43%) of households are food unsecure. Household size, economic asset, non-farm income and stocking of food negatively and significantly influenced the farmer's food security status while remittance, savings and number of adults in a household significantly and positively influenced it. The study concluded that Nigerian small-scale farmers are food unsecure and significant factors influencing food security status should be manipulated to achieve food security. Young educated graduates should be encouraged to take up farming profession by providing them with credit facilities and effective extension service delivery for the nation to achieve food security.
*Keywords**: Food security, logit model*

INTRODUCTION

One of the basic needs of every living individual is food, therefore; whenever a people fail to solve their own food problems; the destination of such a people remains doubtful. Nigeria has not been able to solve its own food and agricultural problems. There still exist conditions of malnutrition, hunger and infectious diseases outbreaks; because of challenges facing food production in Nigeria (Sadiq, 2003).

Small scale farmers in Nigeria have to cope with production risks and other challenges. Millions of the Nigerian small scale farmers are not making it and they are hungry especially in off-seasons. Most of the small scale farmers and their children are undernourished and malnourished respectively. Poverty is synonymous with food insecurity in Nigeria. Poor people are mostly found in rural areas, where up to 80 per cent of the population lives below the poverty line and social services and infrastructure are limited. And majority of the small scale farmers live in these rural areas. Nigerian poor rural women and men depend on agriculture for food and income. Empirical literature also revealed that the greater percentage of these low income earners depends on small farms and resides in the rural areas (Nmadu *et. al*., 2015).

Nigeria has the wherewithal to feed herself. It is endowed with land resources, diversity of crops and livestock and human resources and intelligence with which to harness all these for adequate food production. It is only 36% of the available arable land is under cultivation currently. What is lacking is political will. If these huge potentials are well tapped Nigeria's agriculture is expected to feed the teaming population and provide food for industries and export (Babalola, 2002). But food demand and self-sufficiency ratio projections show that food items could not attain 70% self-sufficiency (Omaliko, 1997). Between 1999 and 2002, the Federal Government of Nigeria (FGN) spent over ₦250 billion on food importations (Babalola, 2002). It is worthy to note that Nigeria was once able to feed herself. The food insecurity problem started due to civil war, drought, population explosion, neglect due to oil

boom or doom and corruption. In realization of this food problem, FGN attempted to put some programmes in place to restore agricultural production and forestall food shortages and importations, but the modest growth achieved has not solved these problems. The weaknesses of the program were poor targeting mechanism, failure to focus on the poor, programme inconsistency, poor implementation, and corruption (Nmadu *et. al.,* 2015). Some of such programmes are Agricultural Development Project, National Accelerated Food Production Project, Strategic Grain Reserve Scheme, Directorate of Food Road and Rural Infrastructure, Agricultural Land Development Authority, Department of Fertilizer, Food Security and the most recent is Nigeria Incentive-Based Risk Sharing for Agricultural Lending (Agriculture Today, 2011). However, some of these programmes have not achieved much of its objectives in terms of food availability and accessibility (Ayoola *et al.*, 1991). Because of these unsuccessful programmes due to sincere commitment of the executors and corruption, there are evidences of food security problems even at farm level. Therefore, the scope of this study is to investigate the food security status of the small scale farmers.

Theoretical Framework
Nigerian Small-scale farmers
Nigerian agriculture is dominated by small producers. Nigerian small-scale farmers see agriculture is a way of life rather than a business. The farmers are conservative in behavior, slow in adopting new practices and value elements of traditions, customs and taboos (Awolola, 2014). They cultivate small scattered plots of land and depend on rainfall rather than irrigation systems. These small-scale full-time farmers constitute an important and invaluable sector of Nigerian economy. Ninety-five percent (95%) of farm holdings in Nigeria are small-scale and subsistence in nature. These set of farmers produce 98% of food consumed in Nigeria and 99% of exported agricultural products (Awoyemi, 1981 and Stock, 2009). An average Nigerian farmer still use hoe and cutlass and they do not practice modern agricultural production techniques (Sadiq, 2013). However, the small-scale farmers are very efficient in utilization of productive resources available to them at their level of technology. But the full potential of the available resources are yet to be fully harnessed by farmers for optimum production because of lacks of information, skills, modern farming implements, infrastructures, credit and improved input supply importation. The consequence of these has been low output and invariably food insecurity and importation (Olyide, 1980; Opara, 2010, Stock. 2009). It is worthy of note that even the small producers themselves are not left out of the negative effects of low agricultural production and food crisis. But there is need to review the concept of food security as it applies to micro and macro levels.

Concept of Food security
The Food and Agriculture Organization (FAO) defines food security as a condition where all people at all times, 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 (FAO, 2002). Food security has four dimensions and these are: availability, accessibility, utilization and stability. Availability is the supply of food in an area, accessibility is the physical and economic ability of people to obtain food, utilization means the proper consumption of food while stability is the sustainability of food supplies. Food insecurity is the absence of food security implying that hunger exists as a result of problems of availability, accessibility and utilization or that there is susceptibility to hunger in the future (FAO, 2002). A food insecure household does not know where her next meal would come from (Amaza *et al.*, 2009). Food security is people-oriented and as such the results of attainment of food security are contentment, patriotism, and more productivity of the populace and an ideal environment would thrive. Food security is one of the major elements in national security (Nyangwesoi *et al.*, 2007). Among the fundamental human rights, easy access to food is more important to

food insecure households than the right to basic education, participation in political and social life. Food is a powerful instrument in State policy making and it can be employed to punish enemy and recalcitrant nations, reward friendly States, and influence the political and economic decisions of nations. Therefore, government must be concerned with how to increase food availability (Amaza et al., 2009). A State becomes weak if there is a shortage of food. Food security has social, economic, and political implications for any nation and it shows the level of development of a State. Determinants of food security include supply-side factors, demand-side factors, stability of access to food, food and non-food production parameters; the quality of human capital within the households; household food storage and inventory practices and other socio-economic variables (Amaza *et al.,* 2009; Nyangwesoi *et al.*, 2007; Kohai *et al.*, 2005; Goni, 2005). Therefore, it is in the light of this concept that this study intends to investigate the food security status of the farmers' households and use some of these parameters to determine the food security status of the households.

Agricultural Production in Nigeria
Agriculture to a large extent is about production of crops, livestock, and fishery and forestry products. Agriculture was the main stay of Nigerian economy and could still be restored to its past glory if the endowed potential is unlocked. These huge potentials include six distinct agro-ecological environments with favourable climatic conditions that support many crops, seven months of growing season with average of 110 to 185 rainy days which help in growing many crops twice a year and diversities in temperature, solar radiation, rainfall, vegetation, topography and soils which make possible production of a wide range of crops in Nigeria. Also Nigeria is endowed with human resources with a population of about 170 million (as estimated by NPC, 2006) of which about 70% of it resides in rural areas and engages in farming activities. This population equally guaranteed an active demand and market for farm products. The gender ratio of man to woman is 1:1 and this is good for tilling the land and harvest operations which are male and female work respectively (Babalola, 2002).
In spite of these potentials, the state of agricultural production has not been impressive due to some problems. Such constraints include discontinued, disjointed and poorly implemented and monitored agricultural policies which are hijacked by unintended beneficiaries; poor land use planning and access to land is influenced by socio-cultural factors surrounding ownership and utilization. Other problems are scarcity and cost of farm labour supply due to competing demand amongst industries, construction work and agriculture and rural-urban migration, decreasing active population in farming activities, poor funding and lack of mechanization of farm operations that improve timeliness and qualities of work done (Shaib *et al.*, 1997). All these reduce the scope of agricultural production. Again, post-harvest losses due to lack of storage facilities, poor processing of agricultural products due to lack of technology and technical know-how, soil degradation due to misused, neglect and management, desertification and forest degradation due to overgrazing and indiscriminate felling of tree and fetching of woods, unguided harvest of fisheries and poor livestock management and inadequacy of research funding are constraints facing food production. In addition marketing problems such as bad roads result in post-harvest losses and invariably reduce farmers' interest in increasing output (Babalola, 1996, Adedipe *et al*., 1997, Shaib, 1997; Ikeorgu, 2000, Olaboshola, 2000; Babalola, 2002; Sadiq, 2013). Extension services and farmers' training facilities are still grossly inadequate, because of dearth of trained and skilled extension staff and poor funding. The low level of agricultural education, poor attitude and low level of formal education of Nigerian small-scale farmers; affects agricultural production negatively; therefore, Nigerian agricultural production environment needs transformation for the nation to be food sufficient (Awolola, 2014). If these hurdles are surmounted by providing the farmers with adequate extension education; Nigerian agricultural production would be improved and food would be available and accessible by all the citizenry.

METHODOLOGY
The study was conducted in Nasarawa State, Nigeria. It is located in Guinea savannah region and between latitude 08º335 N and longititude 08º33′ E. The State has a land area of 27,117 Km^2 and population of over 1.8 million. The rainfall varies from 1311.73mm to 1451mm. The major crops grown include yam, cassava, maize, guinea corn, sesame, rice, groundnut and cowpea (Nasarawa State Ministry of Information, 2005; NPC, 2006).
Nasarawa State Agricultural Development Programme Zoning was adopted for the study and these are Western, Central and Eastern zones. A multi-stage random sampling technique was employed to select the samples. At the first stage; Western zone was randomly selected. At the second stage, Nasarawa and Toto Local Government Areas (LGAs) were randomly selected from among the local government areas in the Western zone. At the third stage two farming communities each were randomly selected from each of Local Government Areas. The randomly selected villages were Laminga and Mararaba Odege from Nasarawa LGA, and Toto and Ukya from Toto LGA. Twenty-five respondents each were randomly selected from the four villages at fourth stage. A total of one hundred respondents were used for the study. Pre-tested structured questionnaire was administered to the respondents. Data were collected based on the objectives of the study.

Food security index was used to determine the food security index line by using: $Z_i = \frac{Y_i}{R}$;

where; Z_i = food status of ith household, Y_i = Daily per capita calorie intake of ith household and R = recommended per capita calorie intake (2660 Kcl). $Z_i = 1$ for Y_i greater than or equal to R and $Z_i = 0$ for Y_i less than R. Logit model was used to estimate the determinants of food security among the small-scale farmers. The implicit form of the model is specified as:

$Z_i = \beta_0 + \beta_i X_{i\,(1-15)} + U_i$; Where:
Z_i = Food security status; dummy binary variable (1 if household is classified food secure and 0 = otherwise), X_1 = Household size; number of persons in the household, X_2 = Marital status; dummy variable (where 1 = married and 0 = otherwise), X_3 = Farming experience; number of years household head has been farming, X_4 = cooperative Association; dummy variable (where 1= household head belongs to a group and 0 = otherwise), X_5 = Formal education; number of years of schooling of household head, X_6 = Gender; dummy variable (where 1 = household head is male and 0 = otherwise), X_7 = Farm size; area of land farmed by the household in ha, X_8 = Consumption credit; dummy variable (1 = a member of the household had access to credit and 0 = otherwise), X_9 = Extension contact ; number of visits extension agent, X_{10} = Economic assets; dummy (where1 = household owns other physical assets and 0 = otherwise), X_{11} = Remittances; total annual remittances received by household in Naira, X_{12} = Non-farm income; total non-farm income of household in Naira, X_{13} = Savings; total annual savings against off-season by household in Naira, X_{14} = Stocking food for off-season; total annual food stocked by household in Kg and X_{15} = No of adults in a household, No of adults in a household that supply farm labour.
B_0 = intercept, $B_1 – B_{15}$ = regression parameters to be estimated and U_i = error terms.
As par *apriori* expectations; β3 to β15 are expected to be positive; β1 is expected to be negative and β2 is expected to be either negative or positive.

RESULTS AND DISCUSSION
Description of Socio-Economic Characteristics of Small Scale Farmers
The age of farmers ranges between 25–71 years with an average of 55.5 as indicated in Table 1. This shows the farming population were aging, young people should be encouraged to go into farming to revive agriculture, this finding agrees with Nmadu and Simpa (2014) and Nmadu et. al., (2014). The farm size mean is 0.5 hectare and range of 0.1 to 3.1 and this shows small holdings. There is need for the farmers to acquire more production inputs to

increase their hectare and output. The household size of the farmers is relatively adequate, considering the nature of farm tasks with 75% having more than five persons per household and the mean of 6.2. Majority (62%) of the farmers do not belong to cooperative society and this implies likely poor access to credit for production and consumption. Informal credit source dominates the study area with 55% depending on their limited personal savings and this reduces their scope of operation and food output. The extension contact is poor with mean of 0.67 visits and range of 0–3 and this indicates dearth of information on available modern technologies and consequently the need for improved extension education for increase in agricultural production. Majority (79%) of the farmers had no source of non-farm income. This might contributes to food insecurity especially in dry season where there are no crops on the farm. The formal educational level is poor, 65% had no formal education and this might affect attitude to change and this conform to Awolola (2014).

Table 1: Socio-economic Characteristics of the Small-scale farmers

Variables	Frequency	Percentage	Variables	Frequency	Percentage
Age			**Source of credit**		
25 – 35	14	14	Personal saving	55	55
36 – 46	10	10	Friends/relation	32	32
47 – 57	26	26	Co-operations	10	10
58 – 68	30	30	Banks	3	3
69 and above	20	20	**Total**	100	
Total	100	100			
Mean	55.5		**Extension contact**		
			0 – 1	64	64
Farm size			2 – 3	28	28
0.1 – 1.0	42	42	Above 3	8	8
1.1 – 2.0	30	30	Total	100	
2.1 – 3.0	18	18	**Mean**	0.67	
3.1 and above	10	10			
Total	100	100	**Non-farm income**		
Mean	0.5		Yes	21	21
			No	79	79
Household size			Total	100	
Less than 5	25	25			
6 – 10	48	48			
11 – 15	22	22	**Formal education**		
16 and above	5	5	No education	65	65
Total	100	100	Primary	23	23
Mean	6.2		Secondary	10	10
			Tertiary	2	2
Cooperative membership			Total	100	
Yes	38	38	**Mean**	2.9	
No	62	62			
Total	100				

Source: Field Survey, 2013

Summary of Descriptive Statistics of Quantitative Variables in the Logit Model
Table 2 shows the summary statistics of all the quantitative parameters in the model to describe the nature data used for the analysis.

Table 2: Summary of Quantitative Variables in the Logit Model

Parameter	Mean	Standard Deviation	Minimum	Maximum
Household size	6.2	2.632	1	15
Farming experience	23.86	11.646	3	50
Educational level	2.79	3.919	0	16
Farm size	0.746	0.498	.1	1.9
Extension contact	0.61	1.081	0	4
Non-farm income	7729	16.007.70	0	100,000
Saving	12838.75	14600.91	0	55,000
Remittance	2893	3251.426	0	13,000

Source: Field survey/Computer print-out, 2014

Factors Influencing Food Security Status of Nigerian Small-scale Farmers

Table 3 presents the result of the determinants of household food security status among small-scale farmers in the study area. From the maximum likelihood estimate of the model, the Pseudo R^2 was 0.2491, which implies that about 24.91% likelihood of a household being food secure is strongly explained by the independent variables. The log likelihood ratio (LR) statistic (50.827) is significant, meaning that the explanatory variables included in the model jointly explain the probability of the determinants of food security status of the farming households. This also shows the reliability of the logit model in this study. Fifty-seven percent (57%) of the household was food secured and 43% food unsecure.

Factors that influence food security status of households among the small-scale farmers are household size, ownership of economic asset, remittance, non-farm income, savings, stocking of food and number of adults in the household. Household size significantly ($P \leq 0.05$) and negatively influences household food security status according *apriori* expectation. As household size increases, it becomes more food insecure. Economic asset significantly ($P \leq 0.05$), but negatively influences household food security status. Income generated from rented economic assets or economic asset converted to cash enhances the purchasing power of the farmers and invariably improvement in food security status. Absence of economic asset makes households food insecure. Remittance also significantly ($P \leq 0.05$) and positively affect the food security status of households as par *apriori* expectation, hence households with more remittance are more food secured. Remittance increases the farmer's purchasing power and cushion shocks that may be experienced. Non-farm income ($P \leq 0.05$) significantly influences household food security negatively. Non-farm income is used in purchasing food not produced or out of stock, farm inputs and hiring of labour for increased food production and thus improves food security status. Therefore, where this is absent or minimal the household becomes more food insecure. Savings (cash) ($P \leq 0.01$) significantly and positively influences household food security status according to *apriori* expectation. Savings enable farmers to purchase more productive resources and increase food production and security, cushion effects of shocks, buy food not produced and purchase food out of stock especially at off-season. Stocking of food ($P \leq 0.01$) significantly and negatively influences farmer's food security status. Stocking of food during harvest for lean period improves food security status of the farmer and if this was not done or not possible household becomes food insecure. Number of adults in a household significantly ($P \leq 0.01$) and positively increase household food security status as par *apriori* expectation. Adults members of a household is the major

supplier of farm labour for food production. The number of adult members in a household determines quantity of food production by the household.

Marginal effects of the independent variables were estimated because they are very important for policy and decision making. Marginal effects as presented in Table 4 were estimated for significant independent variables only. It therefore means that 1% or 5% change in the positive and significant variables will increase the probability of households being food secured and the increase would be equal to the values of marginal effects. Reverse is the case for negative and significant variables.

Table 3: Determinants of food security status of small-scale farmers in the study area

Variable	Parameter	Coefficient	Standard error	Z-Values	P>/Z/-values
Constant	β_0	0.518	1.305	0.40	0.691
Household size (X_1)	β_1	-0.2063	0.1097	-1.88**	0.060
Marital status (X_2)	B_2	0.2289	0.6373	0.36	0.719
Farming experience (X_3)	β_3	-0.004	0.0238	-0.17	0.865
Membership of farmers' association (X_4)	β_4	0.2144	0.577	0.37	0.719
Educational level (X_5)	B_5	0.037	0.0808	0.46	0.646
Gender(X_6)	β_6	-0.1484	0.5911	-0.25	0.802
Farm size (X_7)	B_7	0.416	0.7981	0.52	0.602
Access to consumption credit (X_8)	B_8	0.2478	0.6681	0.37	0.711
Extension contacts (X_9)	β_9	-0.0329	0.2831	-0.12	0.908
Economic asset (X_{10})	β_{10}	-1.5464	0,7928	-1.95**	0.051
Remittance (X_{11})	β_{11}	0.0002	0.0001	1.82**	0.069
Non-farm income (X_{12})	β_{12}	-0.00007	0.00003	-2.01**	0.044
Savings (cash) (X_{13})	β_{13}	0-00006	0.00002	2.92***	0.004
Stocking of food (X_{14})	β_{14}	-0.0007	0.0003	-2.28**	0.023
No of adults in a household X_{15})	β_{15}	0.732	0.246	2.98***	0.003
Pseudo(R^2)		0.2494			
Log likelihood		50.827			
LR chi2		33.72			
food secured households		57%			
food unsecure households		43%			

Source: Computer print-out/field survey, 2014, ** 5%, *** 1% levels of significant

Table 4: Marginal effects of Logit regression model

Variable	Parameter	Coefficient	Standard error	Z-Values	P>/Z/-values
Household size (X_1)	β_1	-0.0353	0.0176	-2.01	0.045
Economic asset (X_{10})	β_{10}	-0.2646	0.1265	-2.09	0.037
Remittance (X_{11})	β_{11}	0.00003	0.00002	1.93	0.053
Non-farm income (X_{12})	β_{12}	-0.00001	5.62E-06	-2.17	0.030
Savings (X_{13})	β_{13}	0.00001	3.23E-06	3.48	0.000
Stocking of food (X_{14})	β_{14}	0.0001	0.00005	2.53	0.012
No of adults in household (X_{15})	β_{15}	0.1252	0.0350	3.58	0.000

Source: Computer print-out/field survey, 2014

CONCLUSION AND RECOMMENDATIONS

Nigerian small-scale farmers are poorly educated, cash trapped and aging. A good number of the farmers are food unsecured. Household size, economic asset, non-farm income and stocking of food are directly related to food security status while remittance, savings and number of adults in a household are indirectly related to food security status of the farmers. Therefore, the study recommends that:

1. Young men and women should be encouraged to take up farming by provision of agricultural extension education that meet the educational needs of the farmers for increased food production and enhanced food security status of Nigerian farmers.
2. 3. Formal credit source should be provided for the farmers to enable them purchase more farm inputs and hire more labour to increase food production.
4. Significant socio-economic parameters of the farmers that influence food security status could be manipulated to achieved desired food security level among the farmers. For example, households could be advised to have fewer children, aim at acquiring economic assets, seek sources of earning non-farm income, stock food for lean period, and develop habit of saving for rainy day and to finance production and seek for remittance to enhance food security status.

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