

Food Security Status Among Cooperative and Non Cooperative Farming Households in Rural Akinyele Local Government Area of Oyo State, Nigeria

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Abstract

Enabling policy environment that encourages farmers' cooperative groups towards enhancing their standard of living is not fully in place. Empirical evidence that could sensitise policy makers as well as farmers in this direction is therefore crucial. In comparative terms, food insecurity status of farming households who were members of cooperative society and those who were not was examined in this study. Using a well-structured questionnaire and 2-stage sampling techniques, primary data on household socio-economic and demographic characteristics as well as the quantity consumed per week of locally available food groups were collected from 55 cooperative farming households and 53 non cooperative farming households in Akinyele Local Government Area of Oyo State. Data were analysed using descriptive statistics, food security index, and probit model. Using food security index measured based on daily energy level of 2450kcalories, the food security line (Z) for all the farming households surveyed, co-operator and non-co-operators, was estimated at ₦141.0308 per day per adult equivalent (equivalent to ₦4,231.14 per month per adult). While 76.4% of the sampled cooperative farming households were food secure, only 56.6% of the non-cooperative farming households were food secure. Whereas age and household size were common significant determinants of food security among both cooperative and non cooperative farming households, education (0.0034) and monthly income (0.0043) were only significant for the co-operators. It is concluded that respondents belonging to cooperatives were relatively more food secured than non co-operators. It is therefore recommended that farmers be encouraged to form and join cooperative society and that cooperative activities should be assisted especially at their formative stage as this can serve as a hub to meeting the Millennium Development Goal (MDG) of a well-informed society, reducing poverty by half and ending hunger.

Keywords: Co-operators and Non co-operators, Food security, Farming households.

INTRODUCTION

Food is the most basic of human needs for survival, health and productivity. It is the basic necessity of life. However, in the present time, the availability, accessibility or utilization of this basic necessity of life is under the grip of crisis, as millions of people across the globe suffer from extreme hunger and malnutrition. This food crisis (or food insecurity) phenomenon is particularly alarming in developing countries especially in Africa. Food insecurity is referred to as deficits or shortfalls in actual per capita daily calorie intake below the minimum per calorie intake recommended by FAO and WHO for maintaining the human body-2450kcal/day (Riscopoulos *et al.*, 1988). Also, food insecurity exist when people are undernourished as a result of the physical unavailability of food, lack of social or

economic access to food, and/or inadequate food utilization (Mohammed, 2003). Food security on the other hand is said to exist when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meet their dietary needs and food preferences for an active and healthy life (FAO, 2001).

More than 826 million people are suffering from malnutrition globally in which only a fraction (34 million) lives in the developed world compared to 792 million in the developing countries (FAO, 2001) and 235 million alone in sub-Saharan Africa (FAO, 2010). This shows that high proportion of people in developing countries, most especially in sub-Saharan Africa, is under nourished. Although 14% of the global population is undernourished, the proportion in Africa is

27.4% (FAO, 2002). Statistical estimates documented in literatures have further shown that the total population of people who are malnourished on the African continent have been rising over the past few decades from 111 million in the period 1969 to 1971, to 171 million in the period 1990 to 1992. This increased further to 204 million in the period 1999 to 2001. Nigeria is not left out in this crisis. Despite the abundant resources Nigeria is endowed with, the case of her food security status is particularly so worrisome that among the development problems facing the country, food insecurity ranks the topmost. Although agricultural sector in Nigeria employs about two-thirds of the country's total labour force, contributes about 40% of the Gross Domestic Products (GDP) and provides 88% of non-oil earnings with small farmers accounting for more than 90% of the country's total agricultural output (Oluwatayo, *et al.*, 2008), it would naturally be expected that the food security status of the citizenry would be quite high; however, literature reveals that majority of Nigerians are food insecure (Olayemi, 1996; Omonona and Agoi, 2007; Babatunde *et al.*, 2007 and Ayantoye *et al.*, 2009; Ashagidigbi, 2012). In 1990, 18% of the population (14.4 million) was estimated to be critically food insecure; this increased to 36% (32.7 million) in 1992 and further increased to 40.7% in 1996. Besides this disturbing statistical trend of food insecurity situation in the country, the increased trend in food importation bill from 3.47 billion in 1990 to 113.63 billion in 2002, and then to 348 billion in 2007 (Okuneye 2002; Okunmadewa, 2003; Daily Trust, Tuesday, March 2008) further indicates clearly that the country is under severe threat of food insecurity.

In appreciation of the growing reality of food insecurity among its citizenry, Nigeria at the world food summit (1996), alongside 185 other countries of the world made a commitment to reduce the number of chronically undernourished persons by half in the year 2015. Notwithstanding this commitment of the Nigerian government to alleviate poverty and food insecurity among its citizenry, the food insecurity situation in the country has degenerated to a level that the country is included in the list of 42 "low-income, food - deficit countries". Nigeria was ranked 20th out of 42 African countries studied on the 2006 Global Hunger Index (Okunmadewa, 2003). The 2012 Global Hunger Index (GHI) ranking of World Health Organization revealed that Nigeria was among the developing countries with serious Global Hunger Index of 15.7. The cause of food

insecurity in Nigeria is attributable to the high prevailing poverty level (which has been proved to be a phenomenon among rural dwellers), poor performance of the Nigerian agricultural system and poor implementation of intervention policies (Okunmadewa, 2003; Oyefara, 2005; Omonona, 2010).

Peasant farmers who make up a larger proportion of the work force have limited access to productive resources-financial (credit), land, improved agricultural technologies and various other productive inputs-which all constitute a factor that greatly limit their productivity, investment, savings and income. Moreover they face the problem of insecure farm tenancy, land fragmentation and small size of holdings, as well as lack of access to market (or have only partial engagement in market). These constraints have made it difficult for individual farmer to achieve any substantial improvement in his production capacity in the face of an increasing population of the country, with attendant increase in food demand. The consequence of this is that even the farmers themselves become predisposed to food insecurity. In fact, Okunmadewa (2001) reveals that one major characteristics of the farming populace of Nigeria is food insecurity. Specifically in 2004, National Bureau of Statistics (NBS) in its study on the relative poverty by occupation of household heads indicates that 67 percent of households whose heads engaged in agriculture were poor and by implication lack the means to secure access to sufficient food at all time. Most of food insecure households live in rural areas where food is produced; they are still net food buyers rather than sellers.

With a nexus between food insecurity and poverty been established, it could be said from the foregoing that poverty, besides poor implementation strategy of government policies, is a major constraint to rural farmers' access to food. Characteristically, rural poverty is not only related to food security but also to access to assets, services and market, income-earning opportunities and organizational and institutional means for achieving these needs (Ayantoye *et al.*, 2011). In the midst of this crunching impoverishment and hunger, farmers resolved to a number of coping options to enhance their farm production and improve their general wellbeing. One of these options includes pooling their resources and working together as members of cooperative society. A cooperative society is an organization of persons who have voluntarily joined together to achieve a common end through the formation of a democratically controlled

organization, making equitable contribution to the capital required and accepting a fair share of the risk and benefits of the undertaking in which members actively participate (Jerry, 1989). Through the formation of farmers cooperatives, production output can be raised at minimal cost since the group would be able to take advantages of scale economics, overcome barrier to assets and manage available resources better, have access to larger piece of land either by pooling or leasing, have enhanced access to information delivery on agricultural production, especially information on market situation, have access to enriching educational and training programmes as well as attract financial resources from banks among others (Jerry, 1989; Holloway *et al.*, 1999; Chambo, 2009). Since food insecurity is connected with poverty and low income, increased farm income through effective commercialization of produce by cooperative society will enable rural households meet their food consumption needs whether through expanded own production of food or purchase from the market. Also an effective cooperative structure put in place can eliminate the activities of middle-men who exploit farmers and reduce the price of agricultural produce at the farm gate (this has implication for the farmer's profit margin). This study seeks to know, through comparison, whether or not being a member of any cooperative society can enhance an individual's food security status.

Problem statement

In many African countries, food crises have assumed a disturbing dimension. In the sub-region of West Africa, about 16% of the people are undernourished. Although there was a decrease in undernourished population in Nigeria from 14.7 million in 1990-1992 to 10.8 million in 1995-1997, this figure increased to 12.5 million people in 2003-2005. Several intervention programmes such as Community Action Programme for Poverty Alleviation (CAPPA), National Food Security Programme, FADAMA, and National Poverty Eradication Programme have been put in place both in the urban and particularly in the rural sector to alleviate poverty and food insecurity but with marginal success as impact largely remained unfelt by the poor (Yusuf, 2008). This calls for a fundamental review of the past approaches and achievements to see what lessons can be learned (Oni *et al.*, 2011). The Federal Government earnestly seeks to re-strategize and develop an approach that will ensure that better progress is made towards

achieving the first Millennium Development Goal, particularly among the rural populace who constitute more than half of the country's population. It is documented in literature that in the midst of impoverishment and hunger, farmers resolved to a number of viable coping options to enhance their farm production and improve their general wellbeing (Reardon *et al.*, 2002; Salimonu *et al.*, 2006). One of these options includes pooling their resources and working together as members of cooperative society (Chambo, 2009). Though an age-long legal organization, Cooperatives are the only means to bring the poorest segment of society into an organizational fold as legally recognized entities, providing opportunity for employment and better income along with the needed support services (Prakash, 1999). Findings in food and policy literature have also proved that there is strong evidence that farm families and cooperatives can provide a decentralised system of food security and employment (Coldman, 2009). Although cooperatives have been in existence for long, it is pertinent to carry out an empirical study which seeks to examine the food security status of rural households who are cooperative society members relative to their non-cooperating counterparts in order to validate (or otherwise) the relevance of cooperative society as an approach that will ensure that better progress is made towards achieving the first Millennium Development Goal of halving the proportion of hungry people by 2015. In view of this, the study attempted to find answers to the following research questions: What is the expenditure of cooperative and non cooperative farming households on food? What is the food security status of cooperative farming households relative to their non cooperative counterpart? Does membership of any cooperative society necessarily make farming household food secure? What factors influences the food security status of cooperative and non cooperative farming households?

Objectives of the study

The main objective of this study was to compare the food security status of cooperative and non cooperative farming households in rural Akinyele Local Government Area of Oyo State. The specific objectives were to:

- establish a food security line for the farming households
- profile the food security status of cooperative and non cooperative farming households, and categorise respondents into food secure and non-food secure group

- identify the socio-economic characteristics of the rural farmers that influence their food security status.

Literature review and conceptual framework

The concept of cooperation:

Cooperation has existed ever since the first two men discovered that by working together they can accomplish their work more efficiently (Khol and Downey, 1972). The Department For International Development (DFID) defined cooperative, building its the definition on four major catch words: First, they are formed by groups of people who have a specified need or problem; Secondly, the organization is formed freely by members after contributing to its assets. Thirdly, the organization formed is governed democratically in order to achieve desired objectives on equitable norm. Fourthly, it is an independent enterprise promoted, owned and controlled by people to meet their needs (DFID, 2008). Cooperatives are the only means to bring the poorest segment of society into an organizational fold as legally recognized entities, providing opportunity for employment and better income along with the needed support services (Prakash, 1999); they are organizations that have come to be recognised as a legal institution that provides a veritable strategy to meeting income and production shortfalls. In relation to the provision of credit facilities to farmer members, cooperative has been identified to be a better channel of credit delivery to farmers than the NGO's not only in term of its ability to sustain the loan delivery function but also in terms of its promptness in doing the same (Alufohai, 2006). Okwocha *et al*, 2012 carried out a study to evaluate agricultural credit utilization by cooperative farmers in Benue State of Nigeria. The result of analysis showed that 88.5% of the respondents sourced their credit from non-institutional sources, more than 87.7% of the respondent utilized credit for the purpose of Agricultural production and that the loan acquired by the respondents had significant impact on their output and income. Farmers do request credit loans not only to meet increased agricultural production needs but also to augment household income in order to adequately meet food consumption needs and so avert or at least reduce the negative impact of food insecurity on their households. In connection with marketing, farmers are more willing to accept productivity enhancing measures if they are sure of the market and the price for the increased produce. Tanguy *et al.*, (2008) working on the commercialization

behaviour of cereal producing smallholders in Ethiopia found that cooperatives obtained higher prices for their members though they were not associated with a significant increase in overall share of cereal production sold commercially by their members. Orthman *et al.*, (2009) noted that agricultural cooperatives are responsible for stimulating poor farmers to make entry into markets, enhancing demand for standard and grades for perishable commodities.

The concept of food security/insecurity

The term food security is understood and used in multiple ways at the level of individual, household, community, regional, national and world. According to World Food Summit (1996), food security exists when all people, at all times, have both 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, 1996). Within the context of this definition four salient variables are central to the definition of food security. These distinct variables include; food availability, food access, food utilization and, sustainability of access to food (Bonnard, 2001). Access represents the household's capacity to fulfill nutritional requirements. It is ensured when all households and all individuals within those households have sufficient resources to obtain appropriate foods (through production, purchase or donation) for a nutritional diet. Availability is achieved if adequate food is readily available at people's disposal. It means sufficient quantities of appropriate, necessary types of domestically produced food, commercial imports or food aid are consistently available to individuals or are within reasonable proximity to them (Von Braun *et al.*, 1992). Acceptability addresses access to culturally acceptable food, produced and obtained in ways that do not compromise people's dignity, self-respect or human right. Utilization includes both food factors, and dietary intake, and health factors that influence child and maternal nutritional status. Adequate food utilization is realised when food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition and child care techniques exist and is applied, and adequate health and sanitation services exist (Obamiro, 2005). Babatunde *et al.*, (2007) who worked on the socio-economic characteristics and food security status of farming households in Kwara State of Nigeria, using recommended daily calorie required approach to determine the food security status of 94 sampled farming households found

that 36 percent and 64 percent of the households in the study area were food secure and food insecure respectively. Using two stage sampling procedure to obtain 160 farm households in selected across 16 villages in the two Agricultural Development Project (ADP) zones of Ekiti State, Fakayode *et al.*, (2009) found that 12.2% of farm households were food secure, 43.6% were food insecure without hunger, 35.9% were food insecure with hunger (moderate) and 8.3% were food secure with hunger (severe). Obayelu, 2010 classified households in the North central Nigeria into food security status based on certain demographical characteristics using the Rasch model. The result of analysis of the cross sectional data obtained from 396 household heads from two selected areas in the North central showed that only 23.7% households were food secure in the study area. In a study on the effect of social capital dimensions on food security among farming households in Odeda LGA of Ogun State of Nigeria using data collected from 116 farming households, Oni *et al* (2011) found that 45% of the farm households were food secure while 55% were food insecure. Education, income of household head and household size were found to be significant determinants of food security status of farming households in the study area.

METHODOLOGY

The study area was Akinyele Local Government Area of Oyo State. It is one of the eleven local governments that make up Ibadan metropolis. Its headquarters are at Moniya. Akinyele local government area was created in 1976 and it shares boundaries with Afijio Local Government to the north, Lagelu Local Government Area to the east, Ido Local Government Area to the west and Ibadan North Local Government Area to the south. It occupies a land area of 464.892 square kilometers with a population density of 516 persons per square kilometer¹. Akinyele local government area is subdivided into 12 wards with thirty villages in total. Akinyele was chosen as the study area because of the predominance of farming activity in the area. Besides, there have not been many studies in the area that investigate, in comparative terms, the food security status of co-operators and non co-operators. This study attempted to fill this research gap and so further provide a basis for this study.

¹ Source: <http://ibadanland.net/stake-holders-local-government-akinyele.htm>

Data sources, sampling procedure and sample size

Primary data were used for the study. Respondents were selected using 2-stage sampling procedure. The first stage involves random selection of five villages out of the twelve (12) wards in the LGA under study. The villages include, Ajibode, Laniba, Alabata, Mele, and Arulogun. The second stage involved a random selection of 60 cooperative farming households and 60 non cooperative farming households from whom primary data were collected with the aid of a well structured questionnaire. Information from 55 cooperative farming households and 53 non cooperative farming households were eventually used in the analysis. Data collected included socio-economic and demographic characteristics, average monthly income received from primary and secondary occupation, educational attainment, average amount spent on food and non food items per month, sources of credit for farm work and/or related, the quantity purchase and consumed per week of five locally available and consumed food groups; protein (inclusive of both plant and animal protein), carbohydrate, fat and oil, vegetables, fruits, and beverages.

Method of data analysis

Statistical tools employed for the study include descriptive statistics and Probit regression. Descriptive tools such as frequency counts, mean, percentages were employed to summarise the socio-economic characteristics of households (co-operative and non co-operative farmers) while probit model was used to analyse food security status by socio-economic variables of respondents. In addition food security and surplus indices were constructed.

Food security index

Based on the recommended daily calorie requirement, the food security index was computed using the Cost of Calorie function as given in equation and 1 and 2 below (proposed by Greer and Thorbecke, 1986). This method was used because of its simplicity. Households whose daily per capita calorie intake was up to 2450 kcal and above were regarded as food secure while those below 2450 kcal were regarded as food insecure households (FAO, 2007).

$$\ln X = a + bC \dots\dots\dots (1)$$

Where

X = Food Expenditure (N)

C = Calorie Consumption (kcal)

$$Z = e^{(a+bL)} \dots\dots\dots (2)$$

Where

- Z = Cost of minimum recommended energy level (₦); Food security line for the study area
- L = Recommended daily energy level (2450 kcal)
- a = Intercept
- b = Coefficient of Calorie Consumption
- e = A mathematical constant (2.71828)

A household whose average cost of daily calorie consumption is equal to or more than Z is said to be food secure while any household with average cost of daily calorie consumption lower than Z is said to be food insecure.

Surplus/Shortfall Index

The Index is given as:

$$P = 1/N \sum_{j=1}^m G_j \dots \dots \dots (3)$$

$$G_j = (X_j - L) / L \dots \dots \dots (4)$$

Where

- P = Surplus/Shortfall Index;
- L = Recommended daily per capita requirements (2450Kcal.);
- G_j = Calorie deficiency faced by household;
- X_j = Per capita food consumption available to household
- N = Number of households that are food secure (for Surplus index) or food insecure (for Shortfall index). This index measured the extent to which households were food secure or insecure.

The Probit Regression Technique

This was used to estimate the food security status of households as a function of some independent variables. Probit model constrains estimated probabilities to be between 0 and 1; and relaxes the constraint that the effect of independent variable is constant across different predicted values of the dependent variable. This is normally experienced with linear probability model (LPM) (Sobepetji and Belete, 2009). The probit model assumes only the values of 0 and 1 for the variable Y, there is a latent unobserved continuous variable Y* that determines the value of Y. The other advantages of probit model include believable error term distribution as well as realistic probabilities (Nagler, 1994). We assume that Y* can be specified as follows:

$$Y^* = X' \beta + \varepsilon$$

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

Then Y can be viewed as an indicator for whether this latent variable is positive:

$$Y = 1_{(Y^* > 0)} = \begin{cases} 1 & \text{if } Y^* > 0 \text{ i.e. } -\varepsilon < X' \beta, \\ 0 & \text{otherwise.} \end{cases}$$

Where

- Y = Vector of dependent variable (1 for food secure households; 0 for food insecure households);
- X = Vector of explanatory variables;
- β = coefficient
- ε = Random error
- The determinant /explanatory variables included in the model are:
- X₁ = Age of household head (Years)
- X₂ = Marital Status (Married=1, otherwise=0)
- X₃ = Educational Level (Years)
- X₄ = Household Size
- X₅ = Sex of Household Head (Male 1, Female 0)
- X₆ = Primary Occupation (Farming=1, Non Farming=0)
- X₇ = Farming Experience (years)
- X₈ = Average income (Naira)
- B_i = Coefficients
- ε = Error term/Random error

RESULT AND DISCUSSIONS

Socio-economic and demographic characteristics of cooperative and non cooperative farming households

The Table 1 below shows the categorisation of cooperative and non cooperative farming households in the area under study based on socio-economic and demographic characteristics. The characteristics considered here included age, household size, marital status, educational level, average monthly income, gender, and farming experience of the respondents. The Table reveals that the households exhibit quite dissimilar characteristics for most of the variables considered except for age and sex of the household head which exhibit almost similar characteristics. More married persons were into cooperative (78%) than there were in non-cooperative activity (68%). The percentage of people who had less than or equal to primary education was more for the non co-operators (64.1%) than co-operators (43.3%), implying that more co-operators than non co-operators have educational status higher than the primary. Low education is strongly correlated with being conservative and averse to change, especially adoption of new way of doing things. The significance of the education level of household heads to food security is supported by Agbola (2005) and Babatunde *et al.*, (2007). Both explained that the level of education of household head has significant effect on the probability of household to be food secure. A significant observation is also noticed for household size where the non cooperative farmers had a larger

household size (8) than their cooperative farmer colleagues (6). Babatunde *et al.*, (2007) and Oluyole *et al.*, (2009) observed that household food security decreases with increasing household size. Therefore, in relation to household size, cooperative farmers are more likely to be food secure than non cooperative farmers. Furthermore, non cooperative farming households

had higher farming experience in terms of the number of years put into farming (32.4%) than the co-operators (26.5%). In relation to the primary occupation, majority of the households were into farming as a primary occupation. More non co-operators (58.7%) than co-operators (50.9) take farming as a primary occupation.

Table 1: Socio-economic and demographic characteristics of cooperative and non-cooperative farming households

Household Characteristics	Co-operators (n = 55)	Non co-operator (n = 53)
Age (years)	54.4	56.7
Sex (percentage male)	93	91
Marital status (percentage married)	78	68
Educational level(percentage less than or equal to primary education)	43.3	64.1
Household size	6	8
Farming experience (years)	26.5	32.4
Primary occupation(Farming)	50.9	58.7
Monthly income	₦29,876	₦23,637

Food security status of respondents

The food security index is measured based on daily energy level of 2450kcalories (FAO, 2006). The food security line (Z) for all the farming households surveyed- co-operator or otherwise was estimated at ₦141.0308 per day per adult equivalent (₦4,231.14 per month per adult equivalent). (Table 2). The result of the analysis shows that 76.4% of the sampled cooperative farming households in the study area was able to meet the recommended daily calorie intake of

2450kcalories per capita per day (implying that about 23.6% were food insecure, subsisting on less than the recommended daily per capita calorie requirement of 2450kcalorie). However, only 56.6% of the non-cooperative farming households were able meet the same recommended daily calorie intake (implying 43.4% were food insecure, subsisting on less than the recommended daily per capita calorie requirement of 2450kcalorie).

Table 2: Food security indices: comparative analysis

Variables	Values	
Cost of calorie equation	In X = a+bc	
Constant	4.543557	
Slope coefficient	0.0001655	
Recommended daily energy levels	2450kcal	
Food security line Z: cost of minimum daily energy requirements per		
Adult equivalent	₦141.0308 (per day)	
	₦4,231.14 (per month)	
	Co-operator	Non co-operators
Percentage of households:		
Food secure household	76.4%	56.6%
Food insecure household	23.6%	43.4%

Determinants of food security status among co-operators and non co-operators

The determinants of food security status among farming households have been considered for members of co-operative society on one hand and non members (of co-operatives) on the other as well as the whole farming households composed of both co-operators and non co-operators. This analysis was carried out with the use of probit model. Of the seven variables hypothesized as determinants of food security among co-operative and non cooperative farmers, only four and three were found to be significant at various levels for the co-operators and non co-operators respectively. Result from table 3 shows that while both age and household size were statistically significant for both cooperative (-0.0334 and -0.1633) and non cooperative members (-0.2312 and -0.2312), education (0.0034 and monthly income (0.0043) were statistically significant only for the co-operator. In line with a priori, all significant variables had the expected signs which depict the effect they have on the food security status of the respondents. Age was a significant and negative determinant of households' food security for both co-operators and non co-operators with t-values 1.80 and 2.98, significant at 10% and 1% respectively. While the co-operators had a marginal value of -0.0334 meaning that 1% increase in the age of household head will decrease the probability of the cooperative farmers to be food secure by 3%, the non co-operators had a marginal value of -0.23121 implying that 1% increase in the age of household head will decrease the probability of cooperative farmers to be food secure by 23%. The reason for this negative relationship is that the productivity of household head will likely reduce by age, which ultimately would have adverse effect on the households' food security status. This result falls in line with the findings of Babatunde *et al.*, (2007) and Oni *et al.*, (2011) who worked on social capital and food security and revealed that as respondents' age increases, the probability of household being food secure reduces.

Household size was a significant and negative determinant of food security for both cooperative and non cooperative farming households (t-value for co-operators and non co-operators were -2.62 and -3.09 respectively and both were significant at 1%). Marginal values of -0.1633 and -0.2312 were estimated for co-operators and non co-operators respectively.

The implication of the marginal value is that is that a unit increase in household size will reduce the probability of household to be food secure by 16% and 23% for both co-operators and non-co-operators respectively. This is because as household size increases, income per head declines and the less food secure the household becomes. This result is in line with findings from Olayemi (1998), Oluyole *et al.*, (2009), Oni *et al.*, (2011). Moreover, comparison of the marginal values, in percentage, of cooperative and non cooperative members shows that the non co-operators are more food insecure than their co-operator counterpart with unit increase in household size. Educational level and average monthly income were significant and positive determinants of food security only for the co-operators (t-value = 2.84, significant at 1 % and t-value = 2.10, significant at 5% respectively). Marginal value of 0.0034 for educational status implies that a 1% increase in the year of education of household head will increase their probability of being food secure by 0.34% and also the probability that a household would be food secure is increased by 0.43% as the average monthly income of the co-operators increase by 1%. The result of the pooled data shows that that age, household size and average monthly income were statistically significant for all the sampled farming households.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The study showed that food insecurity still overwhelmingly plagues rural populace in the country with food insecurity incidence higher for households that did not participate in cooperative activities relative to those farmers who were members of one form of cooperative society or the other. This has shown that cooperative societies or similar groups among farmers would be a veritable tool in improving the food security of farmers among other means. Education and income was also discovered to contribute to improved food security status among the farmers. It is therefore recommended that the following policy measures be pursue

- Income smoothening policy option probably in form of credit access and input subsidy should be adopted as farmers with higher income are found to be more food secure in the study area.
- Since cooperative society has the capacity to improve the food security status of member co-operators, enabling policy environment

should be put in place to encourage farmers, especially in the rural locality, to join cooperative society.

- Having found that higher education positively influences households' food

security especially among cooperative members, human capital development through education should be made a priority in policy formulation not only for the co-operators but for all farmers.

Table 3: Determinants of food security status among cooperative and non Cooperative members

Variable	Co-operators		Non-cooperators		Pooled	
	Co-efficient	Marginal effects	Co-efficient	Marginal effects	Co-efficient	Marginal effects
Age	-0.4545 (1.80)*	-0.0334	-0.4770 (2.98)***	-0.2312	-0.4779 (-2.98)***	-0.2654
Sex	5.4159 (1.37)	0.1521	0.033 (0.41)	0.0723	-0.4507 (-0.51)	-0.0134
Marital status	-8.9779 (-1.10)	-0.1412	-0.7060 (0.82)	-0.0237	-0.5675 (-1.09)	-0.0165
Educational level	1.6342 (2.39)***	0.0034	0.1633 (1.51)	0.0118	-0.4008 (-0.72)	-0.0056
Household size	-0.3328 (-2.62)***	-0.1633	-1.1124 (-3.09)***	-0.2312	-1.3013 (-5.22)***	-0.0185
Farming experience	0.3374 (0.80)	0.0013	0.02630 (0.596)	0.0034	0.0352 (1.12)	0.0045
Primary occupation	6.0291 (-0.93)	0.1611	0.316 (0.36)	0.2693	0.5469 (0.92)	0.0184
Monthly income	0.5422 (2.10)**	0.0043	0.0216 (0.32)	0.0029	0.0005 (1.25)**	0.2657
Constant	30.5492 (21.7956)		3.0130 (0.391)		5.21613 (2.34)	
Sample size	55		53		108	
Pseudo R ²	0.5642		0.4541		0.5231	
Chi-square	46.06		50.46		66.76	
Log likelihood	-15.4312		-5.8208		-30.4303	

***significant at 1%, **significant at 5%,

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