



FOOD INSECURITY TRANSITION AMONG RURAL HOUSEHOLDS IN SOUTH-WESTERN, NIGERIA

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Abstract

Food is a basic need of life and sufficient consumption of it is a key for healthy and productive life. All living things need food to satisfy hunger and nourish the body. It is obvious that the United Nations' Sustainable Development Goals (SDGs) cannot be achieved without major changes in food production, distribution and consumption. In fact, food security remains a crucial problem in Nigeria, despite the availability of plentiful natural, physical and human resources; there is still high rate of food insecurity in Nigeria especially in the post planting period. In the light of this basic truth, it is highly imperative that attempts be made at examining food insecurity transition among rural households in South-western Nigeria. Consequently, adopting the descriptive survey research design using two-stage stratified sampling technique. The first stage involved the selection of Enumeration Areas (EAs) based on probability proportional to size (PPS) of the total EAs in each state in Nigeria and Federal Capital Tertiary consisting of a total of 500 EAs. More so, the second stage was a systematic random selection of ten (10) households from each EA to make up a total number of 5000 households consisting of 3,370 rural households and 1,630 urban households. The final number of households interviewed was 4,581 because of a non-response rate

of 0.4 percent. However, due to incomplete information from some households, only 3112 rural households were used for both post planting and post harvesting period. These 3112 households therefore constituted the sample size for this study. The findings of the study showed that the log likelihood of -39.6315 and -56.5341, the pseudo R^2 of 0.5787 and 0.3108 which suggests that about 58% and 31% of the variability in the dependent variable is explained by the independent variables in the model and that the LR (Chi square) of 0.0332 and 0.0679 for post-planting and post-harvesting season respectively implies that the overall model is fitted and the explanatory variables used in the model were collectively able to explain the influence of food insecurity among rural households in Nigeria. Premised on the findings, it was recommended among others that special nutritional programme involving the provision of free meal for the malnourished households becomes necessary. Also, together with all other goals of SDG set out, we can end hunger by 2030.

Keywords: Food insecure, Food insecurity transition, Post-planting, Post-harvesting

INTRODUCTION

Food is a basic need of life (Archibong, 2015) and adequate intake of it is a key for healthy and productive life (Omonona and Agoi, 2007). Food is needed by all living things to quench hunger and nourish the body (Fawehinmi and Adeniyi, 2014). However, on the basis of up-to-date approximations, about 795 million people remain undernourished globally meaning that just over one in every five people in the world are currently unable to consume enough food to live an active and healthy life (FAO 2016). The population of the world is anticipated to grow from 6.9 billion in 2010 to 8.3 billion in 2030 and 9.1 billion in 2050 (FAO, 2016). According to FAO (2016) report, the demand for food is predicted to rise by 50% in 2030 and 70% in 2050. The central challenge facing agricultural sector is not about growing 70% much more food in 40 years but making 70% more food available on the plate (Fanifosi, *et al* 2016). Developing countries is where majority of the world's hungry people live in, where 12.9 percent of the population is malnourished (UNDP, 2017). Among the world's regions, South Asia and sub-Saharan Africa has the highest levels of hunger (World Bank, 2016). This shows that the right to food is still one of the most frequently violated right in the world today (Clover, 2013). Inadequate nutrition is considered a measure of poverty in many societies or synonymous to poverty (Datt, *et al* 2010).

Food security involves access and availability of food, stability of supplies and quality of the diet (Honfoga *et al*, 2010). Many countries experience food insecurity with food supplies being inadequate to maintain their citizens' per capita consumption in which sub-Saharan Africa is the most vulnerable region with regards to food insecurity (Shala and Stacey, 2012). The average amount of food available per person per day in the region is 1,300 calories (FAO, 2010) compared to the world wide average of 2,700 calories. FAO (2010) also concluded that Africa has more countries with food insecurity problems than any other continent. According to Food and Agriculture Organization of the United Nation (FAO) 2016, International Fund for Agricultural Development (IFAD) (2013) and World Food Programme (WFP) (2013), Nigeria have calorie intake of 1730Kcal and an average protein supply of 64g per capita per day below the 2500Kcal minimum recommended daily intake per day. This shows that Nigeria is facing the challenge of unbalanced diet leading to various deficiency symptoms (Iyangbe *et al*, 2009). Also, among the 109 countries assessed by Global Food Security Index (GFSI) (2015), Nigeria was 91st with 37.1 score based on indices of affordability, availability, quality and safety. The level of food insecurity

in the country has continued to rise steadily since the 1980s—from 18% in 1986 to about 41% in 2004, 65% in 2009 and 60% in 2016 (Sanusi *et al.*, 2006; Davies, 2009; WDI, 2016).

However, the first pillar of food security is sustainable production of food (Odurukwe *et al.*, 2011). Individuals have sufficient access to food when they have adequate incomes or other resources to purchase or barter to obtain levels of appropriate foods needed to maintain consumption of an adequate diet / nutrition level (USAID, 2011). Food availability for the farm household means making sure that there is sufficient food available for them through their own production. The seasonal trends in food prices and wage rates have significant effects on the food security status of Nigerian poor household, who according to the findings from the National Living Standard Survey (NLSS) in 2004 spent up to 90 percent of their income on food (World Bank, 2005). One important aspect of the wealth of a nation is the ability to make food available for the populace. In this connection, food security therefore becomes an important factor in any consideration of sustaining the wealth of the nations.

LITERATURE REVIEW

Various approaches to defining food insecurity can be identified. Among the most important a special committee of the United Nations definition seems reasonably comprehensive: "A household is food insecure when it does not have access to the food needed for a healthy life for all its members (adequate in terms of quality, quantity and culturally acceptable), and when it is at undue risk of not having access at all. Some salient features of this concept need a little elaboration.

- The chronic food insecurity, which defines it as an household persistently unable to meet the food requirements of its members over a long period of time marked by continuous, temporary blips of good and bad moments which is a long-term problem. The average access to food over the long term should be nutritionally adequate, and a household should be able to cope with short-term vicissitudes without sacrificing the nutritional needs of any of its members.
- The transitory food insecurity, which concerns *shocks* that briefly push the *level* of food consumption below the requirements. A household can be said to be food secure only if it has protection against such kind of insecurity. Crop failure, seasonal scarcities, temporary illness or unemployment among the productive members of the household or perhaps an emergency need for large cash expenditure may all be reasons for the sudden reduction of a household's access to food to below the nutritionally adequate level.

Eradicating food insecurity has been one main objective in many developing countries in the world for years now. Studies have been done on how to reduce food insecurity in both developed and developing countries. Government policy in Nigeria has progressed on reducing food insecurity and most of these research focuses on national and regional analysis focusing on household and community based variables in explaining food insecurity.

From the literature reviewed, it is obvious that an ample of studies has been carried out in Nigeria on the issue of food insecurity at a national, regional as well as district level in Nigeria till now but no specific concern on the changes of food insecurity among rural households in Nigeria over the years. This study will therefore contribute to the debates of the determinants (correlates) of food insecurity and fill an existing lacuna in the literature by analyzing the changes in food insecurity alongside its incidence, food insecurity level and its depth. It will also shed light on the factors that influence household food insecurity status during the post-planting and post-harvesting season. Hence, this study would therefore use descriptive statistics to show the socio-economic

characteristics of the households as well as using probit model to isolate the factors influencing food insecurity status and its determinants.

Food insecurity remains a crucial problem in Nigeria. It has been perceived that despite the availability of plentiful natural, physical and human resources, there is still high rate of food insecurity in Nigeria especially in the post planting period. Despite the global tenacity to control the food insecurity threat, the report of FAO (2017) on world food insecurity shows that the number of people suffering from hunger has increased every year from 777 million in 2015 to 815 million in 2016. Consequently, global food insecurity, coupled with the sharp increases in world food prices, the financial crisis and the economic depression, is a concept that can no longer be ignored (FAO, 2010). In Nigeria, a Global Hunger Index (GHI) rank of 40 among 79 countries in 2012, together with rising food prices, malnutrition and deaths as a result of widespread poverty are indications of the prevalence of food insecurity in the country. It is also a sign of extreme suffering for millions of poor ones especially rural people (Global Hunger Index Report, 2012).

Although, successive governments have made efforts to achieve food security in the country through the setting up of a number of agricultural development institutions, with special programmes and projects e.g. Food Security Thematic Group [FSTG] in 2009, National Food Crisis Response Program [NFCRP] 2013, Millennium Development Goals (MDG) 2015, Sustainable Development Goals (SDG) 2016, about 9% of (191 million) Nigerians are still food insecure (FAO, 2016). However, the global policy of reducing hunger, achieving food security, improving nutrition and promoting sustainable agriculture with a focus on reaching Zero Hunger by 2030 is one of the targets of the Sustainable Development Goal 2 which is considered as a great tool for appraising the growth of the country (UNDP, 2017). Prior to 1990s, food security in Nigeria remained motivated by socio-economic objectives comprising of nutrition improvement of rural communities, generation of supplementary family income, food shocks and prices, creation of employment and diversification of income generating activities which was promoted by international organizations, agencies and government at Federal, State and Local Government levels (Hendrix *et al*, 2013).

At present, the problem of food insecurity especially during the hunger period among rural households in Nigeria is long standing (Obamiro *et al*, 2005). This is because after harvesting of crops, most rural households are food secure as they have enough food from their own production (Compton *et al*, 2011). Due to inadequate processing, preservation, handling, storage facilities and the fact that these households have other important needs, they usually end up selling their excess produce at low prices during the harvesting period (Adepoju and Adejare, 2013). Most times, they rely on market purchases since they do not have enough to subsist on, the year round. This leads to inconsistent food availability thus contributing to food insecurity during the period (Manyong *et al*, 2011). The majority of farmers living in rural areas are peasant farmers (Otaha, 2013) and do not often have adequate capital to expand their scale of production (Ebong, 2011).

This study will contribute to the growing literature on household food security by addressing the knowledge gaps through the assessment of the changes in food insecurity of rural households between two (post-planting and post-harvesting) farming periods using national representative data collected specifically with a view to providing suggestions for increased sustainability of household food supply and better targeting policies. This empirical research which ambitiously assessed the changes in food insecurity among rural households during the pre-planting and post planting season in Nigeria therefore fills some of the key research gaps in this area using the logit model to differentiate between the four categories of the changes (ever food secure, ever food insecure, exiting food insecurity and entering food insecurity).

The statement made above as regards storage during harvest period having the capability of reducing food insecurity in planting period is in the realm of hypothesis. Arising from the foregoing, the research work propose to answer the following question in order to unravel empirically the changes of food insecurity that occur during the post planting and post harvesting period of 2015/2016.

- What are the socioeconomic characteristics of the households during the post planting and post harvesting period of 2015/2016?
- What is the profile of food insecurity change during the post planting and post harvesting period of 2015/2016?
- What are the factors that influence the changes in food insecurity status in between the post planting and post harvesting period of 2015/2016?

Based on the previous discussion, the general objective of this study is to carry out the changes of food insecurity status among rural households for 2015/2016 post-planting and post-harvesting periods in Nigeria. The specific objectives are:

- To identify the socio-economic characteristics of the households.
- To profile the changes in food insecurity status of the households in between the two periods.
- To assess the factors that influence household food insecurity status during the post-planting and post-harvesting seasons.
- To determine the households food insecurity changes during the post-planting and post-harvesting seasons.

METHODOLOGY

The area of this study is Nigeria. It is made up of 36 States and the Federal Capital Territory (FCT), Abuja. It has 774 Local Government Areas (LGAs) and a population of 158.4 Million (World Bank, 2010). Nigeria is located in West Africa on the Gulf of Guinea between Benin and Cameroon and lies between latitudes 4° to 14° N and longitudes 2° to 15° E. It has an area of 923,768 square kilometers and shares borders with Cameroon in the East, Chad in the Northeast, Niger in the North, Benin in the West and Atlantic Ocean to the South. Nigeria's climate is arid in the North, tropical in the center, and Equatorial in the South (Ikyase, 2016). Mean maximum temperature is 30° C in the South and 33° C– 35° C in the North. High humidity is characteristic from February to November in the South and from June to September in the North while low humidity coincides with the dry season. Annual rainfall decreases Northward and rainfall ranges from about 2,000 millimeters in the coastal zone (averaging more than 3,550 millimeters in the Niger Delta) to 500–750 millimeters in the North (Federal Research Division, 2008).

Secondary data used for this study is the post planting and post harvesting visit for the third wave of the General Household Survey Panel collected by National Bureau of Statistics (NBS) in conjunction with the World Bank. The third wave of the GHS-Panel data was carried out in two visits, that is, post-planting visit in September–November 2015 and post-harvest visit in February–April 2016. This data was collected in response to the needs of the country, given the dependence of a high percentage of households on agricultural activities in the country.

This study adopted a descriptive survey research design, which is “ex-post facto” in nature. The sample technique was a 2-stage stratified sampling. The first stage involved the selection of

Enumeration Areas (EAs) based on probability proportional to size (PPS) of the total EAs in each state and Federal Capital Territory and the total households listed in those EAs. A total of 500 EAs were selected using this method. The second stage was a systematic random selection of ten (10) households from each EA to make up a total number of 5000 households consisting of 3,370 rural households and 1,630 urban households. The final number of households interviewed was 4,581 because of a non-response rate of 0.4 percent. However, due to incomplete information from some households, only 3112 rural households were used for both post planting and post harvesting period. These 3112 households therefore constituted the sample size for this study.

Different analytical techniques used include descriptive statistics, food insecurity index and probit model. Descriptive statistics were used to describe the socio-economic characteristics of the households. The food insecurity index was also generated and used for measurement of food insecurity changes of respondents during the planting and post planting seasons. Probit model was used to assess the factors that influence household food insecurity status during each year of the post-planting and post-harvesting period and to determine the household's food insecurity changes during the post-planting and post-harvesting season.

Descriptive statistical analysis which comprises of frequency distribution tables, mean and also standard deviation were used to analyse the data and describe the respondents in relation to their socioeconomic characteristics. Also, the food insecurity status of households in the study area was examined using the food insecurity index as defined below:

$$\text{Food insecurity Index} = \frac{\text{Food security line}}{\text{Per capita food expenditure of household}}$$

The food insecurity index seeks to identify the factors affecting food insecurity and the relationship between these factors. It looks beyond hunger to the underlying factors that influence the ability of consumers to access sufficient amounts of safe, high-quality and affordable food. Food insecurity index less or equals to one indicate that the household is food secure, food insecure households in the study have an index greater than one. Information on monthly expenditure on food items was used to calculate the average per capita food expenditure. The food insecurity index was also calculated for each of the households based on their socio-economic characteristics.

The household's food insecurity index was determined using the ratio of food insecurity line and per capita household expenditure on food. The food insecurity line was estimated by obtaining the 2016 value of the food component of the absolute poverty line used in the latest poverty profile for Nigeria from the Harmonized Nigeria Living Standard Survey of 2009 (NBS, 2009). The higher the value of the food insecurity index, the higher the food insecurity status of the households which implies that the food insecure households have less per capita food expenditure.

A probit model was used to determine the factors influencing the status of the households during the post-planting and post-harvesting season (Baulch and McCulloch, 1998). The food insecurity status of households which is bivariate, taking the value of 1 for food insecure households and 0 for food secure households was used as the dependent variable. The model specification is as follows:

$$Y_i = b_0 + b_1X_1 + b_2X_2 + \dots + b_{20}X_{20} + e_i$$

Where Y is the dependent variable, X₂ = Sex of the household head (D=1 if male; 0 otherwise), X₃=Marital status (D=1 if married; 0 otherwise), X₄=Age of household head (Years), X₅=Primary education of household head (D=1, if Yes; 0 otherwise), X₆=Secondary education of household head (D=1, if Yes; 0 otherwise), X₇=Tertiary education of household head (D=1, if Yes; 0 otherwise), X₈= Years of farming experience, X₉= Dependency ratio (number of persons working

in a household/ number not working), X_{10} = Farm size (hectares), X_{11} =Access to extension services (1 if yes, 0 if otherwise), X_{12} =Access to credit facilities (D=1, if Yes; 0 otherwise), X_{13} = Occupation status of the household head (D=1, if household head is into farming as primary occupation; 0 if otherwise), X_{14} =Access to remittances (D=1, if household has access to remittance; 0 if otherwise), X_{15} = Assets ownership (D=1 if household own assets, 0 if otherwise), X_{16} =North-Central (D=1, if Yes; 0 otherwise), X_{17} = South-South (D=1, if Yes; 0 otherwise), X_{18} =North-West (D=1, if Yes; 0 otherwise), X_{19} =South-East (D=1, if Yes; 0 otherwise), X_{20} =South-West (D=1, if Yes; 0 otherwise),

The *a priori* expectations of variables that affect the household food insecurity status during the post-planting and post-harvesting season are showed in table 1 below.

Table 1: Priori Expectations of Independent Variables with Respect to the Factors Influencing Food Insecurity Status

S/N	Variable	Expectation
1	Sex of the household head	+ Amao and Ayantoye (2015) - Abimbola <i>et al</i> (2013)
2	Age of household head	+ John <i>et al</i> (2013), Bashir <i>et al</i> (2013)
3	Farm size	+ Ahmed <i>et al</i> (2014)
4	Marital status of household head	+/-
5	Educational status of household head	+ Haile <i>et al</i> (2005)
6	Access to credit	+ Osei <i>et al</i> (2013)
7	Asset ownership	+Haile <i>et al</i> (2005), Adepoju <i>et al</i> (2013)
8	Farming experience of household head	+ Babatunde <i>et al</i> (2007)
9	Dependency Ratio	- Ojogbo (2010),Shahjahan <i>et al</i> (2016)
10	Access to remittance	- Osei <i>et al</i> (2013)
11	Access to extension services	+ Kalineza <i>et al</i> (2001)
12	Household size	+ - Osei <i>et al</i> (2013)
13	Occupational Status	+ Abimbola <i>et al</i> (2013)
14	North Central	+
15	South South	-
16	North West	+
17	South East	-
18	South West	-

Source: Authors Compilation (2017)

This study also used probit model to determine the household food insecurity changes during the post-planting and post harvesting season. The model is stated as

$$H_{ij} = b_0 + b_1W_1 + b_2W_2 + \dots + b_{19}W_{19} + e_1$$

Where H_{ij} is the dependent variable for the various household food insecurity changes $i=1 \dots 3112$, $j= 1$ or 0 for insecurity status, $H = f(X_1, X_2, \dots, X_{20})$, the four categories of the changes in food insecurity are as stated below: $H_{11} = 1$ if ever food secure, 0 if otherwise, $H_{12} = 1$ if ever food insecure, 0 if otherwise, $H_{13} = 1$ if exiting food insecurity, 0 if otherwise, $H_{14} = 1$ if entering food insecurity, 0 if otherwise, $b_0 =$ Constant term, $W_1 =$ Household size (Number), $W_2 =$ Sex of the household head ($D=1$ if male, 0 if otherwise), $W_3 =$ Marital status of the household head ($D=1$ if married, 0 if otherwise), $W_4 =$ Age of household head (year), $W_5 =$ Primary education dummy ($D = 1$ if Household head has primary education, 0 if otherwise), $W_6 =$ Secondary education dummy ($D = 1$ if Household head has secondary education, 0 if otherwise), $W_7 =$ Tertiary education dummy ($D = 1$ if Household head has tertiary education, 0 if otherwise), $W_8 =$ Years of farming experience, $W_9 =$ Dependency ratio (number of persons working in a household/ number not working), $W_{10} =$ Farm size (hectares), $W_{11} =$ Access to extension services (1 if yes, 0 if otherwise), $W_{12} =$ Access to credit facilities (1 if yes, 0 if otherwise), $W_{13} =$ Occupation of the household head ($D=1$ if household head is into farming as primary occupation, 0 if otherwise), $W_{14} =$ Access to Remittance ($D=1$ if household has access to remittance, 0 if otherwise), $W_{15} =$ Assets Ownership ($D=1$ if household own assets, 0 if otherwise), $W_{16} =$ North-Central ($D=1$, if Yes; 0 otherwise), $W_{17} =$ North-West ($D=1$, if Yes; 0 otherwise), $W_{18} =$ South-South ($D=1$, if Yes; 0 otherwise), $W_{19} =$ South-East ($D=1$, if Yes; 0 otherwise), $W_{20} =$ South-West ($D=1$, if Yes; 0 otherwise).

The a priori expectation of variables that examine the determinants of food insecurity changes are shown in table 2.

Table 2: Priori Expectations of the Independent Variables with Respect to the Food Insecurity Changes

Variable	Ever food secure	Ever food insecure	Exiting food insecurity	Entering food insecurity
Households size (W_1)	+	-	+	-
	(Ahmed <i>et al</i> 2014)	(Amao <i>et al</i> 2015)	(Babatunde <i>et al</i> 2007)	(Osei <i>et al</i> 2013)
Primary education (W_2)	-	+	-	+
	(Ayantoye <i>et al</i> 2015)	(Haile <i>et al</i> 2005)		
Secondary Education (W_3)	-	+	-	+
Tertiary Education (W_4)	-	+	-	+
Age (W_5)	+	-	+	-
Marital status (W_6)	+	-	+	-
Gender (W_7)	+	-	+	-
Farming Experience (W_8)	-	+	-	+
Dependency Ratio (W_9)	+	-	+	-
Farm size (W_{10})	-	+	-	+
Access to Extension (W_{11})	-	+	-	+
Access to credit (W_{12})	-	+	-	+
Occupational Status (W_{13})	+	-	+	-
Access to Remittance (W_{14})	-	+	-	+
Asset ownership (W_{15})	+	-	+	-
North Central (W_{16})	-	+	-	+
North West (W_{17})	-	+	-	+
South West (W_{18})	+	-	+	-

South East (W ₁₉)	+	-	+	-
South South (W ₂₀)	+	-	+	-

DISCUSSION AND FINDINGS

The food insecurity line used in this study was obtained by getting the raising factor, that is, ratio of rural food consumer price index of Nigeria as at November 2015 and April 2016 with the rural food consumer price index of Nigeria as at November 2009 (base year), multiplied by the absolute food poverty line from the National Bureau of Statistics (2010) to get the food insecurity line.

Table 3: Deriving the Food Insecurity Index for Farming Households

Variables	Values
2009 Absolute food insecurity line (NBS,2010) per annum	N39,759.49
Rural food consumer price index 2009 (base year)	100
Rural food consumer price index as at December, 2015 (NBS,2016) during harvesting season	188.6
Rural food consumer price index as at May, 2016 (NBS,2016) during planting season	205
Raising factor for harvesting season	$188.6/100 = 1.886$
Raising factor for planting season	$205/100 = 2.050$
2016 Food insecurity line (Raising factor multiplied by the food poverty line of 2009) per annum for harvesting season	N74,986.40
2016 Food insecurity line per month for harvesting season	N6,248.87
2016 Food insecurity line (Raising factor multiplied by the food poverty line of 2009) per annum for planting season	N81,506.95
2016 Food insecurity line per month for planting season	N6,792.25

Source: NBS, 2010; NBS, 2016

The 2016 food insecurity line was estimated as N 6,248.87 per month for harvesting season and N6, 792.25 for planting season and the food insecurity index was generated as the ratio of this food insecurity line and the per capita food expenditure. This implies that a household whose per-capita food expenditure was below N6,248.87 was classified as food insecure while a household whose per-capita expenditure equalled or was above this amount was classified as food secure for harvesting season and N6,792.25 for the planting season.

Table 4a: Changes in Food Insecurity Status of Rural Households

	PS		HS	
	Frequency	Percentage	Frequency	Percentage
Food secure	670	22	1802	58
Food insecure	2442	78	1310	42
Total	3112	100	3112	100

Source: Author’s compilation, 2018

Seventy eight percent of the households are food insecure during the post-planting season while forty two percent of the households were food insecure during post-harvesting season. The result is in line with the works of Baulch et al (2003), Ribar and Hamrick (2003) that households move in and out of poverty and food insecurity. This may be attributed to the poor storage facilities of food crops, food scarcity and high level of poverty.

Table 4b: Markov Chain (Probability Transition Matrix) on Changes in Food Insecurity Status

2015 (HS)	2016 (PS)	
	Food Secure	Food Insecure
Food secure	500 (0.2775)	1302 (0.7225)
Food insecure	170 (0.1298)	1140 (0.8702)
Total	670	2442

Source: Author’s compilation, 2018 (figures in parenthesis are probability transition matrix)

Table 4b shows the result of the changes and their probabilities. It reveals that 27.8 percent of those who were food secure during harvesting season in 2015 remained food secure during the planting season of 2016, while 72.3 percent of those who were food secure during the harvesting season in 2015 changed to food insecurity during the planting season of 2016. Similarly, 13.0 percent of those who were food insecure during the harvesting season in 2015 changed to food security during the planting season in 2016, while 87.0 percent of those who were food insecure during the harvesting season of 2015 remained food insecure during the planting season in 2016.

Socio-economic Characteristics of the Households

The socio-economic characteristics were defined in terms of: sex of household head, age of the household head, marital status of the household head, occupation of the household head, educational status of the household head, household size, dependency ratio of each household, access to credit, household size, farming experience of household head, farm size, and access to extension services.

Sex of the Household Head

The result of the finding shows that 81% of the household head were male while 19% are female headed. This shows that the farming households are led by males compared to the females, probably due to women's reliance on their husbands in taking farming decisions (FAO, 2005). During Harvesting Season, 40% of female households are food insecure as compared to 45% of male households who were food insecure. The food insecure increased to 76% among female households and male households increased to 78% during Planting Season. From the foregoing, food insecurity is more among male households than female households, based on the food insecurity incidence, depth, severity. Also, the result shows that 45% of female headed household and 54% of male headed household are exiting food insecurity, 39% of female headed household and 61% of male headed household are entering food insecurity, 57% of females and 43% of males are always food secure while 38% of females and 62% of males are always food insecure. This outcome is in disparity to the work of Ribar and Hamrick (2003) that female households are more likely to be food insecure than the male households. A female headed household on the average requires N2649.05 to exit food insecurity, a male headed household on the other hand would require N2890.92 during post-planting season while during post-harvesting season, a female headed household on the average requires N894.90 to exit food insecurity, and a male headed household on the other hand would require N1007.

Age of the Household Head

Most of the rural household heads in were between the ages of 15 and 64 years with only a few above 65 years of age. The mean age of household heads was $49 + 15.25$ years, this means that many of the household heads were in their active working age. It is therefore expected that they will be able to produce enough food for local consumption to be food secured. Seventy five percent of households whose heads fell within the age group 14 and above were food insecure and this increased to 82% for the age group 15–64 years, 53% for age group 65 and above during HS while 41% of households whose heads fell within the age group 14 and above were food insecure and this increased to 46% for the age group 15-64 years, 32% for age group 65 and above during PS. The food insecurity index, depth and severity also followed the same pattern. Also, the result shows that 38.1% between ages 14 and above, 41.6% between ages 15 – 64 and 20.3% between ages 65 and above are always food insecure. This follows the same pattern among those exiting FI, entering FI, always FS. Agboola et al. (2004) and London and Scott (2005) said that food insecurity of the households' increases with the age of the household head. This form could be credited to the fact that the capacity to do tough and hard work related with rural livelihood activities of which farming is part decreases with changes in age.

Marital Status of the Household Head

The result of the finding shows that 74.6% of the household heads were married while 7.5%, 4.8% and 13% were single, divorced and widowed respectively. Twenty two percent of the household heads were polygamous married. According to Nnadi *et al*, (2012), marriage encourages complementation of efforts among farming households. The monogamous married household heads are more food secure than the polygamous married household heads. During HS, food insecurity incidence of individuals belonging to monogamous married rural households was 46.1%, while it was 47.7% for households headed by unmarried persons. Similar pattern was

observed during planting season. Also, the result shows that 14.6% of unmarried persons, 12.3% of monogamous married, 27.1% of polygamous married, 21.0% of divorced and 25.1% of widowed are always food insecure. This follows the same pattern with those exiting FI, those entering FI and those always FS. In general, rural households headed by unmarried persons were better than household headed by married persons.

Household Size of the Rural Households

The size of rural households is one of the elements that affect the level of food insecurity in the rural households. The result shows that food insecurity incidence changes as the household size changes. The household size of the rural households ranges from 1 to 18 members. The mean household size is $5.9 + 2.967$ persons. The result is in agreement with the findings of Alber (2003). The rural households were grouped into 3: small (1-6 persons), medium (7-12 persons) and large (13 persons and above). During harvesting season, 19.2% of the households that have small size were food insecure, 52.2% of the households with medium size were food insecure and 68.1% of the rural households with large size were food insecure. In planting season, the same pattern was detected but at an increased rate. 59.1% of the households (small: 1-6) were food insecure, the households (medium: 7-12) changed to 85.1% while the households (large: 13) had 100% food insecurity. Related pattern were also observed for the food insecurity depth and severity which increases with increase in household size. More so, 21.3% of small sized household, 32.9% of medium size and 45.8% of large size are always food insecure. This follows similar trend for households exiting FI, entering FI and always FS. In general, the food insecurity of the households' increases with household size according to Alber (2003)

Educational Status of Household Head

The result of the finding shows that 40% had no-formal education while the highest percentage of 60% had one form of formal education or the other. In addition, for the two seasons, food insecurity indices were higher among no formal education rural households and low among where heads have achieved one level of education or other. The food insecurity incidence almost doubled in HS than PS. The food insecurity depth followed related trend amongst the various groups of educational status of household heads for the two seasons. However, the PS indices were higher than HS. In addition, the amount of food insecurity decreases with more experience in educational criterion of the rural households heads. In fact, 38.5% of household with no formal education are always food insecure, 31.9% with primary education, 21.4% with secondary education and 8.1% with tertiary education are always food insecure. This follows the same pattern with those households exiting FI, entering FI and always FS. This is unrelated with the fact that as educational status of households heads increases, their use of new upgraded farming inputs and practices delivered by the extensions services increases, thereby improving their income and therefore reducing food insecurity.

Years of Farming Experience

Farmers' year of experience in farming is expected to increase quality and quantity of output by reducing pre-harvest and post-harvest losses, increase use of conservation technologies and increase efficiency of farmers (Babalola and Olayemi, 2013). Most of the household head (64.2%) have farming experience between 1 and 20 years and only 16.6% household heads had more than 40 years of farming experience. The mean farming experience is approximately $19 + 14$ years.

About 44.4 % of the households headed by persons having between 1-20 years were food insecure during HS. Similar trend of equivalence was shown by the groups for the food insecurity incidence, depth and severity. In PS, the food insecurity incidences among the households headed by persons of between 1-20 years and 21-40 years and above rose to 76.3 and 80.4%, respectively. The food insecurity depth and index followed a similar pattern of equality between the two sub-groups as experienced in HS. It is significant to likewise mention here that food insecurity incidence for the two groups in PS were very high when compared with HS figure. The result shows that 29.7% with farming experience between 1 and 20 are always food insecure; while 26.6% between 21 and 40 farming experience, 23.7% between 41 and 60 farming experience and 20.1% between 61 and above farming experience are always food insecure. This also follows the same pattern for household exiting FI, entering FI, and always FS. In conclusion, the food insecurity among rural farming households' changes as the years of farming experience changes.

Dependency Ratio

Households with less than one dependency ratio have lower food insecurity indices than households with greater than one dependency ratio. Definitely, the food insecurity incidence changes from 12.5% with dependency ratio zero to 50.7% for households dependency ratio > 1.0 during HS while related changes was also recorded among the four groups of dependency but at higher rate during PS. The similar trend of changes was detected in food security depth in both seasons. The mini group involvement to the food insecurity index measure revealed a similar pattern as with the food insecurity incidence and depth. The result shows that household with 0 dependency ratio are 22.2% always food insecure, 23.0% between 0.001 and 0.999, 26.4% between 1.0 and 28.3% for >1 are always food insecure. This shows a similar pattern for households exiting FI, entering FI and always FS. In general, food insecurity changes with increase in dependency ratio; this is perhaps because more people were to be fed as the ratio increases. This result is in line with the findings of Ribar and Hamrick (2003) and London and Scott (2005) that households with plenty children under the age of 18 years or greater number of dependents in their households were more likely to be food insecure.

Access to Credit Facilities

Only 41% of the households have access to credit for farming. Researches on adoption of agricultural technologies indicate that there is a positive relationship between the level of farming and the availability of credit (Yoga, 2007). Also, during HS, 43.9% of household's heads had no access to credit facilities while the incidence increased to 78.3% in PS. Among the rural households whose heads had access to credit, 40.6% were food insecure in HS and changed to 76.0% in PS. The food insecurity depth and indices followed similar trend. The contributions of the two groups to the food insecurity indices in both HS and PS show a similar trend with the food insecurity incidences. The finding shows that 77.2% of household that have access to credit are always food insecure while 22.7% of them who do not have access to credit are food insecure. This follows the same pattern for household entering FI, exiting FI and always FS. In summary, rural households heads who had access to credit were less food insecure than those who had no access. This result is in agreement with Obamiro (2005). This is so because borrowed funds can be used to improve production through the purchase and use of new improved inputs, thus improving the food security of such households.

Occupational Status of Household Head

Households whose heads engaged in farming are (85%) and households whose heads engaged in non-farming activities (15%) were examined to profile rural household's food insecurity. In HS, the food insecurity incidence is 34.1% amid the household's head who engage in farming as primary occupation and 59.4% among household's heads who engaged in non-farming as occupation (Table 14a). In PS, food insecurity incidence rose from 81.1% for the household heads engaging in farming as primary occupation, and 62.1% of household's heads engaging in non-farming as occupation. The contribution of the two groups in HS and PS to the food insecurity incidence and depth followed similar pattern like the food insecurity index. The result of the findings shows that 59.1% of farming households are always food insecure while 40.9% of non-farming households are always food insecure. This follows a similar pattern for household that are exiting FI, always FS, entering FI. In general, household's heads who engage in farming as primary occupation are more susceptible to food insecurity due to the fact that they had inadequate means of meeting their food needs during the PS due to poor storage facilities and the pressure to off load their spare food crops to meet other financial commitment (Jimoh, 2004).

Access to Remittance

Only 28% have access to remittance while 72% have no access to remittance. The finding shows that households with no access to remittances were more food insecure than those with access to remittances. During HS, the food insecurity incidence increases from 27.7% to 40.0% in PS among households who had access to remittances, while the food insecurity incidence among households who had no access to remittances increases from 46.9% in HS to 93.3% in PS. This showed that households who had no access to remittances were more susceptible to food insecurity than the households who had access to remittances. The contribution of the two groups in HS and PS to the food insecurity incidence and depth followed similar pattern like the food insecurity index. More so, 41.8% of households that have access to remittance and 58.2% of households that have no access to remittance are always food insecure. This follows the same pattern for households entering FI, exiting FI, always FS. This result is in agreement with a priori expectation that access to remittance decreases food insecurity (Agboola et al., 2004). The main reason can be because access to remittances gives a kind of backing to the households during the period of food shortage experienced during the planting season. In conclusion, more food and income is made available through remittance for such households to supplement food needs.

Total Annual Per Capita Income of Rural Households

Most of the households in the study area (70.5%) earn per capita income less than N50, 000. Only 1.9% of the total households earn more than N200, 000 as the annual per capita income from both farm and off farm activities. The average household per capita in the study area is approximately N59,789 + N82,655. From the result, it can be seen that as per capita income increases, the incidence of food insecurity decreases, also the per capita food expenditure increases except for the household with per-capita income of N200, 000 and above. It shows that those household with higher per capita income are always FI (5.1%) as compared to other categories. This follows the same pattern for households exiting FI, entering FI and always FS Findings from Khalid et al (2012) observed that household income associate positively with the household food security. There is a wide difference between the minimum (N2000) and the maximum (N500,000) per capita income of rural household farmers.

Zones in Nigeria

The result of the finding shows that 16% of the households are in south south, 18% of the rural population is in south east, 7% in south west, 20% in north east, 22% in North West and 17% in north central. The disaggregation by zone revealed that rural households in the North-East (56.7 percent), North-Central (48.5 percent) and North-West (47.1 percent) had the highest incidences of food poverty in Nigeria. This is an indication that these households were unable to meet their expected food expenditure. Conversely, households in the South-South zone had the lowest incidence of food insecurity (29.6%). This finding corroborates the findings of Ashagidigbi (2012) in which South-South zone had the least incidence of food insecurity. The severity of food insecurity revealed a higher level of inequality in food expenditure distribution among households residing in North-East zone followed by household living in North-Central zone. However, across the six geopolitical zones, households in the South-South zone recorded the lowest disparity in food expenditure distribution. It shows that 28% of household in north east are always food insecure, as compared to south east, south west, south south, north central, north west which are 6%, 14%, 2%, 23%, 26% respectively. This result shows similar pattern for zones exiting FI, entering FI, and always FS. Findings of Agbola (2013) said that southern zones is greatly influenced by agricultural production, remittances received from external members of households, improved asset based and production capacity of the households as compared to the northern zones which are left with little or no support. Also, the high rate of social vices, bombings and killings in the northern zones has degenerated agriculture causing high burning of farm lands, farmers and farm equipment.

Factors Influencing Food Insecurity Status of Rural Households during Post Planting Season and Post Harvesting Season

To determine factors influencing food insecurity status of rural households during the post planting and post harvesting season, socioeconomic characteristics of the households were regressed and result presented in Table 5.

Table 5: Parameter Estimates on the Status of Food Insecurity among Rural Households

Variables	Post-Planting		Post-Harvesting	
	Marginal Effect	Z-value	Marginal Effect	Z-value
Household Size	0.1460*** (0.0240)	3.87	0.0652* (0.1584)	1.67
Sex	-0.0734 (0.0056)	-0.61	-0.0858 (0.0057)	-1.03
Marital status	0.1500*** (0.3421)	3.42	0.1613 (0.4678)	0.19
Age	-0.0089 (0.0052)	-1.37	-0.0034 (0.0056)	-0.61
Primary	-0.0280 (0.0321)	-1.27	-0.0196* (0.0118)	-1.66
Secondary	-0.0452 (0.0265)	-1.55	-0.0342 (0.1096)	-0.68

Tertiary	-0.1072* (0.3135)	-1.84	-0.0953 (0.1175)	-0.81
Farming Experience	0.0122* (0.0073)	1.67	0.0112* (0.0068)	1.64
Dependency Ratio	0.1920*** (0.0985)	2.93	0.1832* (0.1129)	1.62
Occupation	0.0957*** (0.0050)	3.48	0.0956 (0.0992)	0.96
Access to Remittance	-0.1988* (0.1092)	-1.93	0.0413 (0.4678)	0.94
Access to Credit Facilities	-0.0864*** (0.0532)	-3.83	-0.1019* (0.1764)	-1.93
Access to Extension Services	-0.0718 (0.3005)	-0.67	-0.0953 (0.1175)	-0.81
Asset Ownership	0.1538 (0.3135)	1.43	0.1944* (0.1092)	1.78
North Central	0.1183 *** (0.1516)	3.41	0.0112* (0.0068)	1.64
North West	0.1142*** (0.1982)	3.28	0.0930* (0.1079)	1.86
South East	0.1370*** (0.2017)	3.09	0.1832 (0.1129)	1.32
South West	0.1529*** (0.1671)	4.48	0.2388*** (0.0867)	3.64
South South	0.1413*** (0.1887)	3.21	0.2228 (0.0925)	1.41
No. of observation		3112		3112
Constant		-2.3981*** (4.0514)		-3.6263* (1.565)
Sigma		0.6699		0.7632
Prob>chi2		0.0332		0.0679
Pseudo R2		0.5787		0.3108
Log likelihood		-39.6315		-56.5341

Notes: Marginal effects (rather than coefficients) showed in the table. The marginal effects are computed at the mean of regressors, for dummy variables it is given for a discrete change from 0 to 1. *** Significant at 1%, ** at 5% and * at 10%. The figures in parentheses are the standard errors of the mean.

Source: Author's compilation, 2017.

Table 5 presents the probit regression results of the factors influencing rural household food insecurity status during the pre-planting and post-planting season in Nigeria. The model has good

fit going by the value of the chi-square which is significant at 1 percent. An additional insight was also provided by analyzing the marginal effects which was calculated as the partial derivative of the nonlinear probability function evaluated at each variable sample mean.

The log likelihood of -39.6315 and -56.5341, the pseudo R^2 of 0.5787 and 0.3108 (suggests that about 58% and 31% of the variability in the dependent variable is explained by the independent variables in the model), the LR (Chi square) of 0.0332 and 0.0679 for post-planting and post-harvesting season respectively implies that the overall model is fitted and the explanatory variables used in the model were collectively able to explain the influence of food insecurity among rural households in Nigeria. The constant term is -2.3981 and -3.6263 during post-planting and post-harvesting respectively meaning that if all the predictors are evaluated at zero, the predicted probability will be extremely low.

The result shows that during post-planting, marital status of household head, household size, farming experience of household head, dependency ratio, occupation of household head, and households living in both North-central, North-western, South-east, South-south and South-west zones had significant positive effects on household food insecurity status at 5%, 10% and 1% while during post harvesting season, household size, farming experience of household head, dependency ratio, asset ownership and households living in North-central, North-west and South-west had significant positive effect on household food insecurity status. Tertiary education, access to remittances and access to credit facilities had negative effects on rural household food insecurity status during the post planting season in Nigeria while primary education and access to credit had negative effect during post harvesting season. The marginal effects result of the regression is reported as follows:

The sex of household head was not significant in both post-planting and post-harvesting. With respect to marital status of household head, the positive relationship during post planting indicates that the probability of household food insecurity increases with married household heads. Specifically, married household heads increased the probability of being food insecure by 0.1500 during post-planting season. This is not significant during post-harvesting. This finding is in line with Olayemi (2008).

Household size and dependency ratio had positive and significant effects on household food insecurity status during both post-planting and post-harvesting. In other words, increase in household size and dependency ratio would lead to a decrease in the food security status of a household. Specifically, a member increase in household size and an additional non-working member to the household increased the probability of household food insecurity by 0.1460 and 0.1920 respectively during post-planting season, with 0.0652 and 0.1832 during post-harvesting season. The result is in line with the findings of Olayemi (2008) and Obamiro et al., (2005) in which larger household sizes increased the probability of moving into food insecurity.

Occupation of household head was significant but positive implying that household heads engaged in farming increases the probability of household food insecurity by 0.0957 during post-planting season. This could be attributed to the fact that agriculture which is characterized by seasonal variations in production as well as longer production cycles leads to irregular income and consequently a high probability of being food insecure. This is in agreement with Ayantoye, et al., (2011) that household heads engaged in farming activities increases the probability of being food insecure. This was not significant during post-harvesting. Farming experience also had positive significant effects on both post-planting and post harvesting season indicating that the probability of household food security increases with increase in farming experience of the household head.

Tertiary education had a negative and significant influence on household food insecurity status during post planting season while primary education had a negative and significant influence during post harvesting season. This implies that households whose heads have primary education have a lower probability of being food insecure. Specifically, the probability of being food insecure reduced by -0.1072 for households whose heads had tertiary education during post-planting season and -0.0196 during post-harvesting season. This result is in consonance with Ayantoye et al., (2011), Oni et al., (2011), Amaza et al., (2006) and Riber and Hamrick (2003).

Also, access to credit had negative effects on household food insecurity status during both post-planting season and post harvesting season. This indicates that households with access to credit had a lower probability of being food insecure. Specifically, the probability of being food insecure reduced by -0.0864 and -0.1019 during post-planting and post-harvesting respectively. The significant effect of formal access to credit facilities in lifting households out of food poverty could be due to the ease of obtaining and use of such funds in meeting consumption expenditures such as food, medical, school fees, and social emergencies. This result corroborates the finding of Ayantoye et al., (2011) in which access to credit increased the probability of a household to be never food insecure.

Access to remittances had a negative effect on household food security status during post-planting season implying that households with access to remittances have a lower probability of being food insecure. Specifically, the probability of being food insecure reduced by -0.1988 during post-planting season. This is an indication of the fact that remittances contribute to household income of those that have access to it. This would lead to increase per capita income, increased per capita food expenditure and consequently improved food security status of the household. This is not significant during post planting.

Further, households in North-Central, North-Western, South-Eastern and South-Western, South-south zones had positive and significant effects on household food insecurity status during post-planting season. This is an indication that households residing in these zones were more likely to be food insecure relative to households in the North-East zone. Specifically, households residing in the North-Central, North-West, South East, South-West and South-South zones increased the probability of being food insecure by 0.1183, 0.1142, 0.1370, 0.1529 and 0.1431 respectively during post-planting.

The probability of being food insecure increased by 0.0112, 0.0930, 0.2388 during post-harvesting for households residing in North central, North west and South west respectively This is not significant in South East and South South during post harvesting season. This finding corroborates the findings of Ashagidigbi, (2012) in which households residing in the North-eastern zone had a high probability of being food insecure due to high killing, burning and social vices.

Determining the Households Food Insecurity Changes during the Post-Planting and Post-Harvesting Season

This section presents the results of the determinants of household food insecurity changes during the post planting and post harvesting season.

Table 6: Parameter Estimates on the Determinant of Household Food Insecurity Changes

Variables	Households exiting food insecurity	Households never food insecure	Households always food insecure	Households entering food insecurity
Constant	-0.0074 (0.0749)	0.0313 (0.0457)	-0.0645 (0.4947)	-0.0567 (0.2134)
Household Size	-0.0081 (0.0098)	0.0214 (0.0151)	0.0311*** (0.0058)	0.1324*** (0.0432)
Primary Education	(0.0023) (0.0056)	0.0435 (0.0412)	-0.3216*** (0.1231)	0.2987** (0.1213)
Secondary Education	0.0197 (0.0138)	0.0121 (0.0157)	-0.3562 (0.3214)	-0.0317** (0.0109)
Tertiary Education	-0.0657 (0.0610)	0.0011 (0.0023)	0.0037** (0.0018)	0.0150* (0.0078)
Age	-0.0219 (0.225)	-0.0084 (0.0120)	0.0815* (0.0447)	-0.0147 (0.0891)
Marital Status	-0.0085 (0.0163)	-0.0012 (0.0092)	0.1314 (0.1336)	0.0630 (0.0690)
Sex	0.0119 (0.2535)	0.0024 (0.0092)	0.1925 (0.2036)	0.008 (0.0144)
Farming Experience	-0.0066 (0.0044)	-0.0190*** (0.0064)	0.0776*** (0.0241)	0.0034 (0.0150)
Dependency Ratio	-0.0073 (0.0352)	-0.0005 (0.0007)	0.0106*** (0.0032)	-0.0015 (0.0020)
Farm size	0.2067* (0.1257)	0.0227 (0.0180)	0.0006 (0.0032)	-0.1745 (0.2247)
Access to Extension	0.2266*** (0.0444)	0.0123 (0.0090)	0.2097*** (0.0385)	-0.1920* (0.0985)
Access to credit	0.0616 * (0.0325)	0.0473* (0.0157)	0.0026 (0.0180)	-0.0529* (0.0303)
Occupational Status	-0.1139* (0.0593)	0.0140 (0.0112)	0.0163 (0.0122)	0.1607 (0.8110)

Access to	0.5969***	0.0159	0.0026	0.1347
Remittance	(0.0109)	(0.0123)	(0.0180)	(0.7460)
Asset ownership	0.0882***	0.0473***	0.0026	0.0529*
	(0.0112)	(0.0157)	(0.0180)	(0.0303)
North-central	0.0109	0.0020	0.2915**	0.0081
	(0.2539)	(0.0088)	(0.1336)	(0.0164)
North-west	0.1276***	0.0143**	0.1597	-0.0330***
	(0.0444)	(0.0061)	(0.1385)	(0.0111)
South-east	0.2067*	-0.0227	0.0833*	-0.1745
	(0.1257)	(0.0180)	(0.0479)	(0.2247)
South-south	0.1425	0.2546*	0.0413	-0.0320
	(0.1516)	(0.1359)	(0.4678)	(0.0265)
South-west	0.0127	0.0160	-0.2652	0.0543
	(0.0232)	(0.0240)	(0.1584)	(0.3798)
Chi square	53034.884	59648.692	59284.689	59648.692
DF	453	453	453	453
Prob.	0.00	0.00	0.00	0.00

The coefficients and marginal effects*-denotes significance at 1%, ** at 5% and * at 10%**

It should be noted that a positive sign of a coefficient indicate that an increase in the variable tend to increase the likelihood of the household moving into food insecurity. Similarly, a negative sign of a coefficient decreases the likelihood of the household moving into food insecurity.

In column 4 of Table 6, the probability of moving into FI decreases by -0.1920 ($p < 0.10$), -0.0317 ($p < 0.05$), -0.0150 ($p < 0.10$) and -0.0529 ($p < 0.10$) due to assess to extension services, attainment of secondary education, tertiary education and access to credit respectively. It increases by 0.1324 ($p < 0.01$) with a unit increase in household size and 0.2987 ($p < 0.05$) with a unit increase in primary education. This agrees with Ribar and Harmrick (2003) that the larger the household size the higher the probability of moving into food insecurity. This is as a result of the fact that improved household size is tantamount with higher dependents who do not contribute to household income. The probability of people residing in North West moving into FI decreases by -0.0330 ($p < 0.01$). This is in agreement with Ribar and Hamrick (2003), that household headed by elder person is more likely to move into food insecurity. This could be credited to the fact that the ability to do tough and difficult work linked with rural livelihood activities decreases with increase in age.

Also, column 1 of Table 6 shows that the probability of leaving FI increases correspondingly by 0.2067 ($p < 0.10$), 0.2266 ($p < 0.01$), 0.5969 ($p < 0.01$), 0.0616 ($p < 0.10$) and 0.0882 ($p < 0.01$) with farm size, access to extension, access to remittances, access to credit and

asset ownership respectively. A unit increase in being engaged in farming decreases exiting FI by -0.1139 at ($p < 0.10$). This is agreement with Ribar and Hamrick (2003). This is so because loanable funds can be used to expand production through the purchase and use of modern improved inputs and consequently improve the food security of such households.

In fact, the probability to remain food secure as shown in column 2 of table 6 reveals that the probability to be never food insecure increases with access to credit (0.0473) at ($p < 0.10$) and asset ownership (0.0473) at ($p < 0.01$), and decreases by -0.0190 ($p < 0.01$) with a unit increase in being engaged in farming respectively. The probability of people residing in North West of never being FI increases by 0.0143 at ($p < 0.05$) and those in South South increases by 0.2546 at ($p < 0.10$).

Finally, column 3 of table 6 reveals that a unit increase in household size, age, attainment of tertiary education, farming experience and dependency ratio, access to extension services lead to an increase in the probability to always stay FI by 0.0311 ($p < 0.01$), 0.0815 ($p < 0.01$), 0.0037 ($p < 0.05$), 0.0776 ($p < 0.01$), 0.0106 ($p < 0.01$) and 0.2097 ($p < 0.01$). However, this decreases by -0.3216 with attainment of primary education at $p < 0.01$. The probability of people residing in North Central always staying FI increases by 0.2915 at ($p < 0.05$) and those in South East increases by 0.0833 at ($p < 0.10$).

CONCLUSION AND POLICY RECOMMENDATIONS

There is high level of food insecurity in the study area particularly from food secure in the late rain (harvesting period) of 2015 to food insecure in the early rain (planting period) of 2016. The study has found out that majority of households who move into food insecurity are headed by low educated persons who engage in farming as primary occupation, this calls for an improving access to education particularly, the identified food insecure households. The findings further revealed that food insecurity status was influenced by household size, educational status, age, marital status, farming experience, farm size, dependency ratio, access to extension services, access to credit facilities and occupational status of the household head. The households with large size and high dependency ratio were worst hit by food insecurity. The very few that had fairly small household sizes were food secure. The food insecure households were more among households whose heads had no access to credit facilities.

- **Implication of my findings to agricultural policy**

The SDGs aim to end all forms of hunger and malnutrition by 2030, making sure all people-especially children- have access to sufficient food and nutritious food all round year. With this, special nutrition programme involving the provision of free meal for the malnourished households becomes necessary. Special training to enable them acquire skills fully is being advocated with adequate supply of irrigation facilities to farmers during post planting season.

Safety net in form of providing of subsidized food, farming equipment during the planting period is encouraged. Together with all other goals of SDG set out, we can end hunger by 2030.

- **Implication of findings to practice**

This study suggests that efforts should be made to alert and inspire households to have children they can really take care of. As the study revealed that household with large size and high dependency ratio have the highest level of foods insecurity changes. The very few ones with small household sizes are always food secure.

Farmers should make sure they practice irrigation agriculture whereby water is being stored as to dry season. Adequate storage facilities like silos, barns, sacks should be provided as against post-planting season.

- **Generalization of findings**

Generally in Nigeria, government should encourage farmers to borrow money at regular basis from micro finance banks through promising lending terms. To ease access to credit, the difficulties and bureaucracies (like suitable collateral and education of applicant) involved in formal lending procedures must be removed.

It is also recommended that formation of cooperative societies should be encouraged and institutionalized among rural households.

REFERENCES

- Abimbola, E. G., & Adebayo, O. O. (2013) "Effects of Family Size on Household Food Security in Osun State, Nigeria", *Asian Journal of Agriculture and Rural Development*, 2(2), 136 – 141.
- Amaza P.S., Ayodele O.O, Akinola A.A, & Owombo P.T (2006), Economic Efficiency of Land Improvement Techniques among Cassava Farmers in Kogi State, Nigeria. *Online Journal of Social Sciences Research*. 1(5), 154-159.
- Food and Agriculture Organization FAO (2002). "The state of food insecurity in the world" Rome. . <http://www.fao.org/docrep/005/y4671e06.ht> (Accessed on March 25, 2017).
- Food and Agriculture Organization FAO. (2010) Food Insecurity dimensions of agricultural and rural employment: Differentiated pathways out of food insecurity. Status, trends and gaps Rome: FAO. <http://www.fao.org/publications/agriculture> . (Accessed on November 1, 2017.)
- Food and Agriculture Organization FAO (2015) "State of Food Insecurity in the World" <http://www.fao.org/publications/sofi/en/> (Accessed on April 4, 2017)
- Food and Agriculture Organization FAO (2016) "State of Food Insecurity in the World" <http://www.fao.org/publications/sofi/en/> (Accessed on April 4, 2017)
- Food Security Thematic Programme (FSTP), 2009, "Thematic Programme for External Aid and Development that Finances Projects in the Field of Food Security". <https://www.welcomeurope.com/european-funds/food-security-thematic-programme-fstp> Accessed on November 6, 2017.
- Global Hunger Index Report (GHIR) (2012), "The Challenge of Hunger: Ensuring Sustainable Food Security under Land, Water and Energy stresses". *IFPRI*, 4(1), 24-29.
- Global Food Security Index (GFSI) (2015), "Food Security Improves, But Challenges still Persist". <http://foodsecurityindex.eiu.com/> (Accessed on April 14, 2017).

- Millennium Development Goals (MDG) 2015, “UN Initiative: Millennium Development Goals”
http://www.en.m.wikipedia.org/wiki/Millennium_Development_Goals. Accessed on November 5, 2017.
- National Bureau of Statistics (2009). “Food Security Profile for Nigeria”. NBS Office, Abuja, Nigeria. <http://www.nigerianstat.gov.ng> Accessed on November 2, 2017.
- National Bureau of Statistics (2010). “On the Compilation of Labour Force Statistics for Nigeria”. *CBN Journal of Applied Statistics*, 6(1), 183
- National Bureau of Statistics (2016). “Food Security Profile for Nigeria”. NBS Office, Abuja, <http://www.nigerianstat.gov.ng> Accessed on November 6, 2017.
- National Food Crisis Response Programme (NFCRP) 2013, “The World Bank Response to Food Crises” <http://www.worldbank.org/en/results/2013/04/11/national-food-crisis-response-program-results-profile> Accessed on November 6, 2017.
- National Living Standard Survey (NLSS), 2004, “*Nigerian Gross Domestic Product Report Q2*” <http://www.nigerianstat.gov.ng/pages/download/312> Accessed on November 2, 2017.
- National Population Commission (NPC) 2006. “Population and Housing Census, population distribution by sex, state, LGA”, <http://www.population.gov.ng/images>. Accessed on April 5, 2017
- United Nations Development Programme (UNDP), 2017, “UNDP Support to the Implementation of the Sustainable Development Goals” .
<http://www/UNDP.org/content/undp/en/home/sustainable-development-goals/undp-support-to-the-implementation-of-the-2030-agenda/> Accessed on October 30, 2017.

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