ASSESSMENT OF FOOD SECURITY AND POVERTY STATUS OF CEREAL CROP FARMERS UNDER FADAMA III+ ADDITIONAL FINANCING (AF) IN NIGER STATE, NIGERIA

BY

TSAVHEMBA, Terhide Samuel

MTech/SAAT/2017/6883

A THESIS SUBMITTED TO THE POST GRADUATE SCHOOL FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF TECHNOLOGY IN AGRICULTURAL EXTENSION AND RURAL SOCIOLOGY

SEPTEMBER, 2021

ABSTRACT

Food security and poverty among farming households have become an issue of great concern to policy makers and stakeholders in the agricultural sector as its understanding and concepts can help to reduce the recurring storm of poverty, food insecurity in Nigeria and the global community. Hence, the study assessed food security and poverty status of cereal crop farmers under fadama III+ additional financing in Niger State, Nigeria with the aim of providing empirical results which will serve as an important step towards improving the food security status of cereal farmers in the study area. The specific objectives were to describe the socio-economic characteristics of cereal crop farmers, assess the food security and poverty status of cereal farmers, identify the determinants of food security and poverty status of cereal farmers, assess the effects of food security and poverty status on the output of cereal crop farmers, examine the constraints faced by cereal crop farmers in the study area. A three stage sampling technique was used to select a total of 207 respondents in the study area on which structured questionnaire were administered to extract relevant information; data collected were analyzed using both descriptive and inferential statistics such as Foster, Greer and Thorbeeke (FGT) model, logit regression as well as Ordinary Least Square (OLS) regression model. The result of the socio-economic characteristics revealed that most (36.27%)of the cereal crop farmers were within the age range of 31- 40 years, the mean age of respondents was 39 years, majority were males (95.70%) who were married (91.30%) and had majorly tertiary education (55.35%) with a mean household size of 15 people (23.10%). The mean farming experience was 20 years, mean farm size was 4 hecters, while mean income was ₦481, 034.8 per farming cycle. The result also showed that most of the farmers had no extension visits (39.10%), years in cooperative society had (36.70%) with a mean of 6 years. The result also showed that, more than half were not food secure (59.90%), the FGT measure of poverty indicated that (41.50%) of cereal crop farmers were living below poverty line. The poverty depth was (59.73%), while the severity of poverty was (39.80%). The logit regression result showed that income and extension contact were positively and statistically significant at, 10% level of probability. Similarly, years in school, household size and years in cooperative was negatively significance on poverty status of cereal farmers at 5%, 1% and 5% level of probability respectively. Furthermore, effects of food security and poverty on the output of cereal crop farmers were age, education, household size, farm size, farming experience, extension contact, poverty status and food security. The major constrains to cereal production in the study area were problems of road network, flooding, lack of credit facilities, high cost of hired labour, lack of storage facility, inadequate irrigation facility, inadequate supply of inputs, inadequate farm land, poor soil fertility and problem of weed among others. It was therefore, recommended that, non- governmental organizations, farmer groups and cooperative societies should be more involved in the training and education of farmers since they understand their weaknesses and where to complement. Also, storage facilities should be provided to reduce the large quantity of wastes recorded yearly, this will go a long way in reducing poverty levels and sustaining food security status.

TABLE OF CONTENTS

Cover page

Title page i

Declaration ii

Certification iii

Dedication iv

Acknowledgements v

Abstract vi

Table of contents vii

List of table xi

List of figures xii

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study 1

1.2 Statement of the Research Problem 4

1.3 Aim and Objectives of the Study 6

1.4 Hypotheses of the Study 6

1.5 Justification of the Study 7

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Over view of agricultural sector 9

2.1.1 Concept of food security in Nigeria 10

2.1.2 Dimensions of food security 12

2.1.3 Measurement of food Security 15

2.1.4 Concept of poverty in Nigeria 18

2.1.5 Causes of poverty in Nigeria 21

2.1.6 Poverty situation report in Niger State 24

2.1.7 Cereal crops production area in Nigeria 25

2.1.8 Third National *Fadama* development project additional financing 25

2.2 Empirical Review of Past Studies 27

2.2.1 Socio-economic characteristics of cereal crop farmers 27

2.2.2 Factors affecting food security and poverty status of rural households 31

2.2.3 Determinants of food security status of cereal crop farmers 33

2.2.4 Factors influencing the output of cereal crop farmers 35

2.2.5 Constraints associated with cereal crop production in Nigeria 37

2.3 Theoretical Framework 39

2.3.1 Theory of social change 39

2.4 Conceptual Frame work 41

CHAPTER THREE

3.0 METHODOLOGY 45

3.1 Study Area 45

3.2 Sampling Procedure and Sample Size 46

3.3 Method of Data Collection 47

3.4 Measurement of Variable 48

3.4.1 Dependent variable 48

3.4.2 Independent variables 48

3.5 Method of Data Analysis 49

3.6 Specification of Models 50

3.6.1 Foster, Greer and Thorbeecke index 50

3.6.2 The FGT measure for the i^{th} sub -group (Pαi) is given as 50

3.6.3 Logit regression 51

3.6.4 Multiple regression model 52

3.7 Test of Hypotheses 53

3.7.1 Pearson product moment correlation 53

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION 55

4.1 Socio-economic characteristics of cereal crop farmers 55

4.1.1 Age 55

4.1.2 Gender 55

4.1.3 Marital status 56

4.1.4 Level of education 56

4.1.5 Household size 56

4.1.6 Distance between house and farm 57

4.1.7 Farming experience 59

4.1.8 Farm size 59

4.1.9 Land acquisition 59

4.1.10 Annual income from cereal crop production 60

4.1.11 Contact with extension agent 60

4.1.12 Occupation 61

4.1.13 Access to credit 61

4.1.14 Years in cooperative society 61

4.2 Distribution of respondents according to their food security and poverty status 62

4.2.1 Food security among status among cereal crop farmers 62

4.2.2 Distribution of respondents according to their poverty status 63

4.3.1 Socio-economic determinants of food security of cereal crop farmers 63

4.3.2 Socio-economic determinants of poverty status of cereal crop farmers 65

4.4 Effects of food security and poverty status on output of cereal crop Farmers 67

4.5 Constraints faced by cereal crop farmers 70

4.6.0 Test of Hypotheses of the Study 73

4.6.1 Hypothesis I 73

4.6.2 Hypothesis II 74

CHAPTER FIVE

5.0 Conclusion and Recommendation 75

5.1 Conclusion 75

5.2 Recommendations 75

5.3 Contribution to Knowledge 76

REFERENCES 77

APPENDIX 1 89

LIST OF TABLES

3.1	Sample outlay of registered farmers under *fadama* III+ additional financing	47
4.1.1	Distribution of respondents according to their socio-economic characteristics	58
4.1.2	Distribution of respondents according to their institutional characteristics	61
4.2.1	Food security status among cereal crop farmers	62
4.2.2	Distribution of respondents according to their poverty status	63
4.3.1	Socio-economic determinants of food security status of cereal crop producers	65
4.3.2	Socio-economic determinants of poverty status of cereal crop farmers	67
4.4	Effects of food security and poverty on output of cereal crop farmers	70
4.5	Constrains faced by cereal crop farmers under *fadama* III+ additional financing	72
4.6.1	Relationship between socio-economic characteristics on food security and poverty status of cereal crop producers using correlation	73

LIST OF FIGURES

2.4 Conceptual frame work for the assessment of food security and poverty status of cereal crop farmers 43

3.1 Map of Niger State showing the study area 46

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Food security has been defined as physical and economic access, at all times to adequate food for an active and healthy life, which includes access to nutritionally safe foods and an assured ability to acquire foods in socially satisfactory ways (Food and Agriculture Organization (FAO, 2012). Food security focuses primarily on food availability and to some degree the price stability of basic food stuffs at the international and national levels (Clay, 2002; FAO, 2005). Food security exists when all people, at all times have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life (Idachaba, 2006; Duffuor, 2011; FAO, 2012).

According to FAO (2010), food security underlies the consumption, at any time, by all members of the household (men, women, boys and girls) of an alimentation adequate in quality and quantity, for an active healthy life. The concept of food security includes both physical and economic access to address people's needs and preferences. In that way, a household should have the possibility to consider all its members at all times. FAO (2013) enlisted three main steps towards achieving food security such as; food availability, food accessibility, and food utilization. Firstly, food must be available in sufficient quantities, continuously and consistently. The concept refers to stocks and production in a given area, and the capacity to import food from else where. It implies self-sufficiency of a household, of the community, and of the nation as a whole.

Secondly, people must be able to regularly acquire food, through home and local production or importation. Food access suggests the availability of sufficient resources to obtain nutritious

food, without resorting to emergency aid or other coping strategies. Food access refers equally to sharing practices within the household. Hence, household food access is the ability to obtain sufficient food of guaranteed quality and quantity to meet nutritional requirements of all household members. Here, the food should be at right place at the right time and people should have economic freedom or purchasing power to buy adequate and nutritious food.

Lastly, there must be absolute utilization of available food (these include storage, processing, preservation, cooking, and consumption) and also it must be accessible to farm households without waste. Sarah (2013) explained that the inability of the poor to have access to needed food can be attributed to low income and inadequate food production. Food insecurity on the other hand, implies a temporary short fall of adequate food for a proper diet, as a long term food shortage called chronic food insecurity (Benjamin and Joseph, 2012).

In Nigeria, despite agricultural policies and strategies, the population of food insecure households in Nigeria was about 18% in 1986 (Babatunde *et al*., 2017). This increased to 40% in 2012 and higher in the subsequent years (Enete *et al.*, 2018). Despite the fact that agriculture remains a key component of the Nigerian economy, contributing about 37% of GDP and employing about 70% of the active population, it receives less than 10% of the annual budgetary allocations (Adebayo and Okunneye, 2015). As a result, the agricultural sector has significantly under performed given its vast potential (Machethe, 2016). Nigerian agriculture has failed to supply sufficient food both in quantity and quality to feed the constantly ever growing population. Thus, the level of food insecurity in Nigeria has continued to increase steadily since the 1980s (Babatunde *et al.*, 2017).

Food insecurity rose from about 19% in 2012 to about 41% in 2016; with an estimated population of 180 million,this implies that over 81 million Nigerians are food insecure. That is,

are either hungry, under nourished, or starving. This is not surprising given that about 52% of the population live under the poverty line. In 2012, the National Bureau of Statistics (NBS) published a report stating that most of the poor live in the rural areas where the incidence of poverty is highest. According to NBS report (2012), the North-West and North-East geo-political zones have the highest poverty rates in the country with 77.4 percent and 69.1 percent respectively being poor. These are followed by the North Central with 59.5percent of the population, the South-West zone is the lowest population of the poor with 49.8 percent, while South east had 47.5 percent and South-south 55.5 percent. Furthermore, 60.9 percent of Nigerians were estimated as living in absolute poverty in 2011 as against 54.7 percent in 2004 (NBS, 2012).

Meanwhile, raising agricultural productivity, reducing food insecurity and poverty should be an important policy goal for concerned government since agriculture plays a major role in the economy of many developing countries. It is a significant source of nourishment for citizens and a means of livelihood for the most vulnerable members of this country (Adewuyi, 2014).

Increasing agricultural productivity requires one or more of the following; an increase in input with output increasing proportionately more than inputs; an increase in output while inputs remain the same; a decrease in both inputs and output with input decreasing more; or decreasing input while output remains the same (Adewuyi, 2014; Oni *et al.*, 2016). Increasing inputs in order to expand output involves raising both the quality and quantity of inputs, examples of which will include the mechanization of agricultural processes, use of high yielding varieties of crop seeds or planting materials, use of fertilizers, irrigation in areas where rain fall is inadequate, and the use of agro chemicals such as herbicides and pesticides.

Cereals are those members of the grass family, the *Poeceace* grown for their characteristic fruit, the caryopsis, which have been the most important sources of world's food for the last 10,000 years (Oredipe, 2015). Wheat and barley are the oldest cultivated cereals. Their cultivation started in the fertile crescent of Mesopotamia some 10,000 years ago, this region now include parts of Turkey, Syria, Iraq and Iran (Oredipe, 2015). The major cereal crops in Nigeria are rice, maize, sorghum, wheat, pearl, millet and fonio millet with rice ranking as the sixth major crop in terms of the land area devoted to cereal production. Sorghum account for 50% of the total cereal production and occupies about 45% of the total land area devoted to cereal production in Nigeria (National Extension Agricultural Research and Liaison Station (NEARLS, 2014).

1.2 Statement of the Research Problem

Ensuring food security is one of the greatest problems confronting the country today. It is a complicated phenomenon in which those facing food insecurity will have to decide for themselves how better they can attain food security while keeping in mind their social and economic constraints (Usman, 2018). The concept of food security ensures that household members are able to obtain adequate food either through own production or purchase from the market. Therefore, combating food insecurity entails an increasing access to productive resources such as land, inputs as well as advisory services.

The International Food Policy Research Institute (IFPRI, 2010) reported that cereals crops dominated Nigerian crop production, and Nigeria is the Africa's leading producer of rice, corn, wheat, and millet. However, productivity is below potential yields with the farmer yields of most crops less than half of the potential yield due to increased population pressure. High demand for land for non-agricultural uses has led to decrease in available agricultural land resulting in low

food production, low income, high food insecurity and high poverty prevalence. (Adeolu, *et al*., 2011; Alimi and Ayanwale, 2006; Igbenaese and Okojie-Okoedo, 2010).

Poverty is wide spread and high in rural areas, where Nigeria‘s poverty incidence was 17.7 million poor people in 1980, 34.7 million people in 1985, and not minding the drop between 1985 and 1992 (due to the implementation of the structural adjustment programme), about 39 million people were poor in 1992. In 1996, about 67 million people were poor and despite the drop in incidence between 1996 and 2004, about 69 million people were poor in 2004 (Omonona, 2009; Diao *et al*., 2019). The poverty incidence increased to 69% (or 112.5 million Nigerians) in 2010. According to NBS (2016), both the quantitative and qualitative measurements of poverty attest to the growing incidence and depth of poverty in the country, with almost 100 million people living on less than a $1 (£0.63) a day with majorityof people living in the rural areas and (NBS, 2016). Food insecurity remains a fundamental challenge in Nigeria. The Food and AgricultureOrganization (2014) enlisted Nigeria among countries faced with serious food insecurity problems.

National *Fadama* development programme I, II and III has been implemented to boost the cereal crop sector in Nigeria. There is, however, little to commensurate on the resource output. The *Fadama* project was established by the Nigerian government, in collaboration with the World Bank and the African Development Bank in 1996 and 2001. Some of the problems of these two projects were that *Fadama* I operated a top bottom approach but it contributed in the reduction of crop prices and storage losses, while *Fadama* II was challenged by poor monitoring and documentation which provided the basis for poor accountability, lack of transparency and tracking of project planning and implementation. But the low level of monitoring of *Fadama* sub-projects has been a persistent problem to the successful delivery of *Fadama* development

projects in Nigeria (Oredipe, 2015). It is against these back drops that the study seeks to provide answers to the following research questions:

i. What are the socio – economic characteristics of cereal crop farmers who participated in fadamaIII+ the study area?

ii. What are the food security and poverty status of the respondents?

iii. What are the socio-economic determinants of food security status of cereal farmers?

iv. What are the socio-economic determinants of poverty status of cereal farmers?

v. What is the effect of food security and poverty status on the output of cereal crop farmers' under*Fadama* III + AF in the study area?

vi. What are the constraints faced by *Fadama* III + AF farmers in the study area?

1.3 Aim and Objectives of the Study

The aim of this study is to assess the food security and poverty status of cereal crop farmers under *Fadama* III + additional financing in Niger State, Nigeria.

The specific objectives are to:

i. describe the socio-economic characteristics of cereal crop farmers who participated in fadama III+ AF in the study area;

ii. assess the food security and poverty status of the farmers;

iii. estimate the socio-economic determinants of food security status of cereal crop farmers under *Fadama* III + AF in the study area;

iv. estimate the socio-economic determinants of poverty status of cereal crop farmers;

v. determine the effect of food security and poverty status on the output of cereal crop farmers under *Fadama* III + AF in the study area, and

vi. examine constraints faced by cereal crops farmers under *Fadama* III + AF in the study area.

1.4 Hypotheses of the Study

The following null hypotheses were tested in the course of the study:

$H0_1$: There is no significant relationship between the selected socio–economic characteristics (age, education, family size, farm size, gender, and income) of cereal crop farmers and their food security and poverty status.

$H0_2$: There is no significant effect of food security and poverty status on the output of the cereal crop farmers in the study area.

1.5 Justification of the Study

Considering the rate at which the country's population increases, there is need to match the population increase with food production. Hence, increase in food production is one way to realizing this dream. Cereal crops form the main meal of majority of Nigerian people, both rich and poor. Ensuring the abundance of cereal crops production indirectly implies curtailing food insecurity and reducing poverty to the barest minimum. Which directly implies a bold step towards achieving food security and self- sufficiency objective of the nation.

This study should improve the database of *Fadama* development project for further studies and provide the necessary information on benefiting farmers in the programme with a view to improving and modifying the programme design, planning and implementation strategies, thus accelerating the achievement of the set objectives of the programme. Quite a huge amount of money has been expended both by the World Bank, the Federal Government of Nigeria and State Governments to ensure that farmers are empowered to efficiently utilize their resources with the aim of improving the farmers' income, productivity and reducing poverty among the rural dwellers. The result of the study shall go a long way in bringing to the fore whether the huge amount of money expended on this project is justified.

It would also assist the government and other stake holders in the achievement of self-sufficiency in cereal crop production which is a road map to feeding the nation's growing population. The findings of the study would be useful in providing empirical results of the factors influencing *Fadama* III+ Additional Financing on the output of beneficiaries in Niger State. It should also guide policy makers in formulating and evaluating existing policies on cereal crops production which shall also in a way sensitize the *Fadama* project on further adjustments in view to ensuring that their objectives are achieved.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Over view of Agricultural sector

Agriculture is the main stay of Nigerian economy. It involves small scale farmers that are scattered over wide expanse of land area, with small holding ranging from 0.5 to 3.0 hectare per farm land. It is characterized by rudimentary farm systems, low capitalization and low yield per

hectare (Kolawale and Ojo, 2013). The roles of agriculture remain significant in the Nigeria economy despite the strategic importance of the oil sector. Agriculture provides primary means of employment for Nigeria and accounts for more than one third of total gross domestic product (GDP) and labour force (Babatunde and Oyatoye, 2016). The role of cereals to modern society is related to its importance as food crop through out the world. In most parts of Asia and Africa, cereal products comprise 80% or more of the average diet, in central and western Europe, as much as 50% and in the United States, between 20 - 25% (Onwueme and Sinha, 2012).

Cereals are the major dietary energy suppliers and provide significant amount of protein, minerals (potassium and calcium) and vitamins (vitamin A and C) (Idem and Showemimo, 2014). Cereals are consumed in a variety of forms, including pastes, noodles, cakes, breads, drinks etc, depending on the ethnic or religious affiliation. The bran, husk, plant parts and other residues (after processing) are useful as animal feeds and in the culture of micro-organism. Wax syrup and gum are extracted from cereals for industrial purposes. Different Nigerian ethnic groups use cereal crops residues for different purposes. More than 70% of the working adult populations in Nigeria are employed in the agricultural sector directly or indirectly and over 90% of Nigeria's agricultural output comes from peasant farmers who dwell in the rural areas where 60% of the population live. The vast majority of these farmers have limited access to modern input and other productive resources are unlikely to have access to pesticides, fertilizers, hybrid seeds and irrigation without some form of public sector intervention (Ogunwole *et al.*, 2015). Some of major problems militating cereals production in Nigeria are climatic factors (rainfall, temperature and solar radiation), soil factors, migration, socio economic considerations and government policies, pests and diseases among others. The rate of growth of Nigeria's food

production is 2.5% per annum in recent years, while food demand has been growing at the rate of more than 3.5% per annum due to high rate of population growth of 2.83% (Kolawole and Ojo, 2013). This research attempts to make available vital information that could help in increasing cereals production to meet the ever increasing demand for both its human and animal population.

2.1.1 Concept of Food Security in Nigeria

Food security refers to the availability of food and one‘s access to it. A household is considered food secure when it occupants do not live in hunger or fear of starvation (FAO 2016). Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (Idachaba, 2006). Food security for a household means access by all members at all times to enough food for an active and healthy life. Food security includes a minimum of;

i. The ready availability of nutritional adequate and safe foods

ii. An assured ability to acquire acceptable foods in socially acceptable ways, that is with out resorting to emergency food supplies, scavenging, stealing or other cropping strategies (USDA, 2011).

Food security is a flexible concept as reflected in the many definition in research and policy usage. Whenever the concept is introduced in the title of a study or its objectives, it is necessary to look closely to establish the explicit or implied definition. Food security as a concept originated only in the mid-1970s, in the discussions of international food problems at a time of global food crisis. The initial focus of attention was primarily on food supply problems of assuring the availability and to some degree the price stability of basic food stuff at the

international and national level. The issues of famine, hunger and food crisis were also being extensively examined, following the events of the mid-1970s. The outcome was a redefinition of food security, which recognized that the behaviour of potentially vulnerable and affected people was a critical aspect.

A third, perhaps crucially important, factor in modifying views of food security was that the technical successes of the Green Revolution did not automatically and rapidly lead to dramatic reductions in poverty and levels of malnutrition. These problems were recognized as the result of lack of effectiveness.

In 1983, FAO expanded its concept to include securing access by vulnerable people to available supplies, implying that attention should be balanced between the demand and supply side of the food security equation. "Ensuring that all people at all times have both physical and economic access to the basic food that they need."In 1986, the highly influential World Bank report "Poverty and Hunger" focused on the temporal dynamics of food insecurity. It introduced the widely accepted distinction between chronic insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict. This concept of food security is further elaborated in terms of "access of all people at all times to enough food for an active, healthy life".

By the mid-1990s food security was recognized as a significant concern, spanning a spectrum from the individual to the global level. However, access now involved sufficient food, indicating continuing concern with protein-energy malnutrition. But the definition was broadened to

incorporate food safety and nutrition balance, reflecting concerns about food composition and minor nutrient requirement for an active and healthy life.

The 1994 UNDP Human Development Report promoted the construct of human security, including a number of component aspects, of which food security was one. This concept is closely related to the human rights perspective on development that has, in turn, influenced discussions about food security. In 1996 World Food Summit adopted a still more complex definition, Food security, at the individual, household, national, regional and global levels (is achieved) when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life. This definition is again refined in The State of Food Insecurity 2001.

Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. The international community has accepted these increasingly broad statements of common goals and implied responsibilities. But its practical response has been to focus on narrower, simpler objectives around which to organize international and national public action.

Food Security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern.

2.1.2 Dimensions of Food Security

Food security is the outcome of food system operating efficiently. Efficient food system contributes positively to all dimensions of food security. Following are the dimensions of food security.

(i) Food availability: This dimension addresses supply side of the food security and expects sufficient quantities of quality food from domestic agriculture production or import. This is simple mathematical calculation wether the food available in certain territory/country is enough to feed the total population in that particular territory and calculated from the level of local agriculture production at that territory, stock level and net import/export.

This dimension of food security at different levels can be assessed by precipitation record, food balance sheet, food market survey, agricultural production planet. Similarly, indicators of food security for this dimension at different levels are fertility rate, food production, population's flows harvesting time, staple food production, food storage, consumption of wild foods. (www.foodandenvironment.com)

(ii) Food accessibility

Having sufficient food at national or at certain territory cannot be taken as the proof that all the house hold or individuals in the country/territory have enough food to eat. Food access is another dimension of food security which encompasses income, expenditure and buying capacity of households or individuals. Food access addresses whether the households or individuals have enough resources to acquire appropriate quantity of quality foods.

Some of the indicators of this dimension at different levels are food price, wage rate, per capital food consumption, meals frequency, employment rate etc. and the dimension can be assessed by Vulnerability Analysis and Mapping (VAM), Food Access Survey, Food Focus Group

Discussion, Intra-household food frequency questionnaire etc. interventions to improve this dimension of food security are inter alia on-farm, off-farm, and non-farm employment creation, school-feeding program, breast-feeding campaign. (www.foodandenvironment.com)

(iii) Food Utilization

Food utilization is another dimension of food security which addresses not only how much food the people eat but also what and how they eat. it also covers the food preparation, intra-household food distribution, water and sanitation and health care practices. The nutritional outcome of the food eaten by an individual will be appropriate and optimum only when food is prepared properly, there is adequate diversity of the diet and proper feeding and caring practices are practiced.

Stunting rate, wasting rate, prevention of diarrhoea diseases, latrine usage, weight for age, goitre, anaemia, night blindness etc are the indicators at different level for this dimensions which can be assessed by demographic and healthy survey, immunization chart etc. (www.foodandenvironment.com)

(iv) Stability

This dimension addresses the stability of the other three dimensions over time. People cannot be considered food secure until they feel so and they do not feel food secure until there is stability of availability, accessibility, and proper utilization condition. Instability of market price of staple food and inadequate risk baring capacity of the people in the case adverse condition (e.g natural

disaster, unexpected weather etc), political instability and unemployment are the major factors affecting stability of the dimensions of food security.

This dimension of food security can be accessed by Global Information Early Warning System, Anthropometric survey, weighing chart of pregnant women etc against certain indicators like food price fluctuation, women etc. against certain indicators like food price fluctuation, women's BMI, pre-harvest food practice, migration etc. interventions to address this dimension are saving and loan policy, inter-household food exchange, grain bank, food storage etc.

In summary, availability covers whether adequate food is ready at people's disposal while Access ensures if all households and individuals have adequate resources to obtain the food they need either through production or purchase. Similarly utilization is about human function to adequately ingest, digest and metabolize the food. Stability is about assurance of continuation of afore-mention. (www.foodandenvironment.com)

2.1.3 Measurement of Food security

Napoli *et al.* (2011) in their work identified five commonly used methods that can be used to assess hunger/food security; the Food and Agriculture Organization (FAO) Index method for estimating calories available per capita at the national level; ii) household income and expenditure surveys; iii) individual's dietary intake; iv) anthropometry; and v) experience-based food insecurity measurement scales.

(i) Food and Agriculture Organization (FAO) method of food security estimation: This method estimates calories per capita at the country level using Food Balance Sheets and energy intake variance data derived from household income and expenditure surveys. Countries need the following information to be able to apply the method: i) total calories available in year of

interest; ii) number of people living in country in year of interest; iii) coefficient of variation of caloric intake to generate the energy intake distribution curve; iv) cut-off point to estimate the proportion of the population falling under the minimum per capita average caloric requirement.

The main advantages of this method are that: i) almost all countries generate the data needed and estimate their daily per capita caloric availability; ii) estimates are frequently updated thus allowing the national, regional, and global food insecurity trends across time to be examined and compared; iii) the method is inexpensive. Its limitations includes: i) dietary quality is not taken into account; ii) the national average per capita caloric intake does not allow for understanding the intra-country caloric distribution as a function of household characteristics; iii) method assumes that caloric consumption above minimum caloric threshold indicates food security, when in fact obesity has become a problem among the poor with excessive caloric consumption being associated with mild to moderate levels of food insecurity; iv) high degree of measurement error in numerator (balance sheets provide data on the amount of calories available but not necessarily consumed) and denominator (i.e., number of inhabitants living in the country in the year of origin). Overall, the origin of data used by countries is sometimes difficult to understand and of questionable validity, and there is little standardization and quality control across countries; v) establishing an average per capita caloric requirement cut-off point has several conceptual weaknesses as in reality it is a function of physical activity levels, gender and age, among other factors (Napoli *et al.*, 2011).

(ii) Household income and expenditure surveys: National household expenditure surveys are used to assess the consumption levels and welfare of a population. The food data gathered regards the amount of food acquired rather than consumed by household members and this food acquisition data has three sources:

- purchases of food at home and away from home;
- gifts of food or food received as payment for labour;
- home-produced food

The amount of dietary energy that is available to a household each day is calculated by converting food items into their kilocalorie values, adding up a total and dividing that figure by the number of days under consideration. This figure is then divided by the number of adult members of the household and the adequacy of dietary energy available can be evaluated. An estimate of energy intake should be reported as such and not include references or consideration of dietary needs unless (and this is unlikely) these have been specifically evaluated in the population concerned. One of the advantages of estimates of energy consumption from Household income and expenditures surveys (HIESs) is that intakes and distribution of dietary energy at the household-level are revealed. These estimates could be of great value if focussed on specially selected countries (Napoli *et al.*, 2011).

Food security index estimation using expenditure on food per capita method of Arene and Anyaeji (2010) (cited by Omonona *et al.* (2007); classify respondents into food secure and food insecure households in a bid to establishing the food security status of the individual households. The formula is given as:

$$Fi = \frac{Percapitamonthlyfoodexpenditureforitheithhousehold}{2/3\ meanpercapitamonthlyfoodexpenditureofallhouseholds} \qquad (1)$$

Where Fi = Food security index, When Fi ≥ 1 it implies that the ith household is food secure, but when Fi < 1, it implies that the ith household is food insecure. A food secure household is, therefore, that whose per capital monthly food expenditure is at least two-third of the mean per capita monthly food expenditure. On the other hand, a food insecure household is that whose per

capital monthly food expenditure is less than two-third of the mean monthly per capita food expenditure (Arene and Anyaeji, 2010).

The advantages associated with Household Income and Expenditure Survey (HIES) and the Food Intake Surveys (FIS) include: i) it allows for the identification of households at risk of food insecurity, thus in addition to mapping from the local to the national level, the determinants and consequences of food insecurity can be examined; ii) it collects dietary quality data that can be taken into account to understand the dimension of the food insecurity construct; iii) it can be used to evaluate national food and nutrition, and anti-poverty programmes. This method has the following limitations: i) it measures the amount of food available but not necessarily the amount of food consumed within the timeframe of interest, for example, it is quite difficult to measure the amount of food wasted, consumed by guests or fed to household animals; ii) it is difficult to estimate the amount of food consumed outside the household as many people can report how much they spend but have a difficult time reporting accurately the foods consumed outside the household; given the frequent consumption by the majority of the world's population of many different kinds of street foods and fast foods, accurately recalling this information is indeed a daunting task; iii) periodicity in food acquisition can bias the results, for example, it is possible that household members consumed foods that were purchased before the reference period, thus they would be omitted; likewise foods may have been purchased but may have not been consumed during the period of interest, in this instance these foods would be included in the estimate when in reality they should have not; iv) different countries use different methods for data collection and estimation of key parameters, making it difficult, if not impossible, to compare estimates across countries and regions; v) the conversion of the estimated foods available to the household into caloric intakes involves making major assumptions, thus

accepting a high degree of measurement error in the key indicator derived from this method; vi) the method is expensive and requires major input from inter-disciplinary teams making it difficult to apply nationally on an annual basis (Rafael and Maria, 2017).

2.1.4 Concept of Poverty in Nigeria

Poverty entails inadequate income and absence of basic necessities such as education, health services, food, clean water and sanitation that are necessary for human survival and dignity (World Bank, 2017). It denies its victims the most basic needs (food, water, clothing and shelter) for survival. World Bank (2014) viewed a poor person as one who is undernourished and cannot care for himself. Food security on the other hand is reported to be a situation where all people, at all times, have access to sufficient, safe and nutritious food to meet dietary needs and food preferences for an active and healthy life (Food and Agriculture Organization (FAO), 2016. Food security involves, food availability, food accessibility and food affordability furthermore, Oriola (2012) defined food security as producing food that will go round every citizen both in quantity and quality.

This definition recognizes poverty‘s broader features, such as hunger, poor education, discrimination, vulnerability and social exclusion. In the light of the International Bill ofRights, poverty is defined as a human condition characterized by sustained or chronic deprivation of the resources, capabilities,choices, security and power necessary for the enjoyment of an adequate standardof living and other civil, cultural, economic, political and social rights (see also UN 2016; Hunt *et al.*, 2014). As observed by Kankwanda, *et al.* (2015) poverty is either absolute or relative or both. Absolute poverty being that which could be applied at all time in all societies, such as the level of income necessary for basic subsistence, while relative poverty relates to the

living standard of the poor to the standards that prevail elsewhere in the society in which they live. Related to the definition of poverty are the measurements of poverty whose importance is to know who is poor, how many people are poor, and where the poor are located.

According to Foster *et al.* (2010); and Omonona (2014), the most frequently used measurements are:

(i) the head count poverty index given by the percentage of the population that live in the household with a consumption per capita less than the poverty line.

(ii) poverty gap index which reflects the depth of poverty by taking into account how far the average poor persons' income is from the poverty line.

(iii) the distributional sensitive measure of squared poverty gap defined as the means of the squared proportionate poverty gap which reflects the severity of poverty. Studies by UNDP also advocate the use of Human Development Index (HDI) and Capability Poverty Measure (CPM). According to UNDP (various issues) HDI combines three components in the measure of poverty which include, longevity as measured by life expectancy at birth, educational attainment as measured by a combination of adult literacy (two-thirds weight) and combined primary, secondary and tertiary enrolment ratios (one-third weight); and improvement in standard of living as measured by real GDP per capita income (PPP). The first relates to survival vulnerability to death at a relatively early age. The second relates to knowledge – being excluded from the world of reading and communication. The third relates to a decent living standard in terms of overall economic provisioning. On the other hand, CPM focuses on the average state of peoples'capabilities by reflecting on the percentage of people who lack basic or

minimally essential human capabilities that are ends in themselves, needed to lift one from income poverty and sustain strong human development.

Achieving food security in Sub-Saharan Africa remains a difficult challenge because of widespread poverty, surge in world food prices, changing climatic pattern resulting in global warming Long *et al.* (2013) reported that rural people face the threat of food insecurity due to income inadequacies, poverty and limited access to production resources among others. Adewuyi and Hayatu (2014) is also of the view that there is a linkage between poverty and malnutrition because most of the people with little or no access to rich nourishing food are rural dwellers who are engaged in subsistence farming which provides little income for the farmers. Food expenditure according to Olagunju *et al.* (2012) forms a large share of the spending of poor households, making them relatively more vulnerable to the impacts of food price inflation. They went further to state that food shortages are likely to be more prevalent in low income households than the wealthier households. More so, Labour productivity and income per capita in rural areas have lagged behind than in urban areas, increasing the concentration of poverty among the rural population.

However, Hoddinott (2002) observed that poverty status changes among households and has led to the increasing recognition that there are considerable flow in and out of the poverty pool implying that the poverty status of household is not static but dynamic. This means that, while some households live permanently in poverty, others only experience it temporary due to negative shocks resulting from sudden loss of welfare. In calculating poverty, there is varying approach. Some of the approaches as outlined by Muhammad (2017) include

i. The Calorie Intake Approach which puts into consideration the calorie requirements: The sufficiency of calorie is used as a standard of welfare and the most useful measure of absolute poverty.

ii. The basic Need Approach: This method one calculates the poverty line by constructing a food poverty line which is based on an idea of the minimum amount of money required by a household to purchase basic needed food bundle. If cost of basic needs is estimated, then the food poverty line added to the non-food needs will equal the overall poverty line.

iii. Relative Poverty; Relative line is not fixed over the domain of poverty comparisons. Poverty line is related to average income or consumption in a country/region of reference. This line is in relation to the average standard of living of a particular society at a certain time changes with the average earnings of the households.

In Nigeria, poverty gap is widening and a greater percentage of the nation is becoming food insecure since household food security depends substantially on household income and asset (or wealth) status. In view of this, it is vital to examine the level of poverty and food insecurity so as to come up with strategies to reduce the effect of poverty and enhance food security in Niger State Nigeria.

2.1.5 Causes of poverty in Nigeria

(i) Unemployment

Unemployment is a major factor contributing to poverty in Nigeria. There is a strong correlation between unemployment and poverty. When people are unemployed, their source of livelihood depletes over time. The cost of living becomes high and the standard of living goes down. There are many people in Nigeria who lack the opportunity of being employed. The formal

unemployment rate in Nigeria as estimated by the World Bank in 2017 was 4.9 percent and Nigeria ranked 61st across the world countries (CIA Factbook, 2019).

As reported by Teshome (2018), the African Development Indicators report of the World Bank showed that "education, once seen as the surest, undisputed gateway to employment, no longer looks so certain." This is very true in the case of Nigeria. The fact that you are an educated Nigerian is no guarantee that you will be employed. Furthermore, according to the World Bank report, unemployment in Africa is higher among those who have attained a higher education of some kind, and also those in wealthy households because they depend solely on the wealth of their families and do not consider employment a priority.

Many graduates in Nigeria wander the streets without anything reasonable to do for a living. The government is capable but unwilling to provide jobs for them. Employment in Nigeria is usually not based on merit but depends on how connected you are with people that have power. This leaves many highly qualified people in poverty as seemingly no one cares to know what theyare capable of achieving. These people are missing out on the income they would have gotten if they were employed. The number of quality jobs in the economy is low and many government resources are misallocated. Unemployment-induced poverty tends to increase the crime rate and violence in the country. Most unemployed youths resort to crimes such as armed robbery, kidnapping for ransom, internet fraud and other forms of fraudulent activities. The reservation wage they get from these activities is typically barely enough to take careof their basic necessities Teshome (2018).

(ii) Corruption

Transparency International defines corruption as the abuse of entrusted power for private gain. This has become a common act in Nigeria and it has destabilized the political system drastically. Government funds are being misappropriated on a daily basis by the leaders, who only put the interest oftheir family and friends at heart while ignoring the masses. The corruption has eaten so deeply into the government and economy that everyone seems to be blinded by it. Corruption has almost become an accepted way of life in Nigeria Teshome (2018).

In Nigeria, the government's income is generated mostly from natural resource revenues. This income, instead of being used for developmental purposes, is then circulated among the political office holders and their families, leaving the rest of the people to wallow in poverty. Political leaders practically ignore the affairs and wellbeing of their people whoelected them into office. They mismanage and embezzle funds. There are several issues involved with bad governance in Nigeria, use of wrong policies, adaptation to wrong policies and implementation of those wrong policies. In any case, it is clear that Nigeria's corruption has increased poverty and inequality as well as contributed to high crime rates.

(iii) Laziness

Laziness is a common disease which is virtually suffered by many Nigerians today, especially those from wealthy households. Everyone wants to be comfortable but they are not ready to work towards it. This often leads to greed where people will do whatever they can to keep the family wealth for themselves. In most families, everyone depends on the bread winner, who works so much to keep the family going and when he dies the family is likely to become poor because of mismanagement of funds. In most Nigerian families, the death of the bread winner means the

death of the whole family fortunes; because everyone was depending on him/her to provide everything Teshome (2018).

(iv) Poor education system

Education can play a major role in reducing poverty. According to the World Bank, education is central to development. It promotes economic growth, national productivity and innovation, and values of democracy and social cohesion. In Nigeria, the population with no education account for most of the poor. The education system in Nigeria can be regarded as a failure compared to other countries in the world. The United Nations Universal Declaration of Human Right states that everyone has the right to an education. This right to education has been denied to many Nigerians, of which many of them can be considered invisible to the society now. This deprivation of education applies more to females than males, because they are considered the inferior sex. Hence educating them is seen as unnecessary as they are expected to marry as early as possible Teshome (2018).

2.1.6 Poverty situation report in Niger State

The National Bureau of Statistics (NBS) (2012) in its report on the country's 2010 poverty profile, make available Statistics on the poverty condition in Nigeria. According to the report, 69.05% representing more 112,519 million Nigerians lived in relative poverty conditions compared with 54.7% in 2004 and at the same time, the infant mortality rate was 108 in 2010 as against 101 in 2005. Similarly, the Niger State core welfare indicator questionnaire (CWIQ) survey discloses that the dependency ratio in the state was 0.87 while 0.96 and 0.78 were the ratio for the rural and urban areas respectively which is consistent with the report. The survey also disclosed that 71.5% of all the households sampled categorized themselves as poor, whereas

71.2% of male- headed households and 84.8% of female headed households were poor. However, for an individual town like Minna attempting to deal with the problems of urban poverty, this level of aggregation may not be adequate for answering specific questions such as where the deprived are situated in the town, whether theres are disparities among poor areas, and how to plan poverty reduction programmes and strategies.

However, the World Bank (2017) in its studies disclosed that poverty in Nigeria is devastatingly a rural problem. Consequently, it is of utmost importance to analyze the poverty condition among household's residents in Niger State alongside the background of the present attempt by the Niger State Government.

2.1.7 Cereals production area in Nigeria

The Nigerian savannah ecology is the major cereal production area in Nigeria. It accounts for about 665,600 square kilometres (about 67 million hectares), which also represent about 70% of the geographical area of Nigeria (Idem and Showemimo, 2014). It is located between latitude 07° to 14°N and longitude 03° and 15°E. Ogungbile and Olukosi (2012) stated that 85% of country's land mass lies within the savannah region.

They equally stated that more than 70% of the population that live in savannah region of Nigeria depends largely on small subsistence farming. West Africa alone produced 49.1 and 51.4 million toneso f 139.5 and 144.7 in 2014 and 2016 respectively, of Africa cereal production andNigeria accounts for more than 60% of West Africa's cereals production.

2.1.8 Third national *Fadama* development project additional financing (FADAMA 111+ AF)

The National *Fadama* Development Project (NFDP) was established to guarantee all-year-round growing of crops and promotion of simple and low cost improved irrigationunder a World Bank financing. Food crops grown under the *Fadama* include rice, leafy, vegetables, okra, maize and other crops including root and tuber. *Fadama* projects aimat reducing poverty and increasing farm productivity and income of participants (Bello, 2018). The projects so far (NFDP I, II and NFDP III) so far, were adjudged successful by both national and international assessors culminating in Federal Government of Nigeria requesting the World Bank for implementation of the third National *Fadama* Development Project (NFDP III+ AF). The scope of the Third National *Fadama* Development Project (NFDP III) was extended to involve all 36 states in the federation and the Federal Capital Territory (FCT) as a tri-partite funded intervention of the World Bank, the Federal Government of Nigeria and participating States. Funding is by World Bank contributing 55.6%, Federal Government of Nigeria, 5.1%; participating States and Local Governments contributing 17.1% and 8.9% respectively.

The Third National *Fadama* Development Project Additional Financing is an International Development Association (IDA) credit facility assisted project with co – financing sources from the federal Government, the state Government and Communities (i.e benefitting farmers) in terms of their counterpart contributions and beneficiaries' contributions. It is to be implemented in four years period (i.e 2014 – 2017). The *Fadama* III+ AF was designed to scale up the project's impact and effectiveness in selected project intervention areas beyond the typical *Fadama* land through investing in; sustainable common user infrastructure facilities, technical assistance to support cluster of farmers, seed multiplication and appropriate agricultural machinery, enhancing demand driven adaptive and applied agricultural research, extension and ancillary services and strengthening project management, monitoring and evaluation system.

The *Fadama* III+ AF is consistent with the development objective of the just concluded *Fadama* III project. No major changes are proposed to the design or implementation arrangements of the original project. The present results framework has been revised with new monitoring of core indicators. By doing this the project would help reduce rural poverty, increase food security and contribute to the achievement of a key millennium development goal.

In this regard facilitators had been deployed to Nigerian communities to provide training and technical support to all categories of *Fadama* resource users. To improve performance ofthe programme in each state and ensure welfare delivery, statutory and independent assessments need to be made *with* evidences gathered from farmers themselves. Many similar studies such as Olaolu *et al*. (2010) Ike, (2012), Yunana *et al.* (2013) Iwala, (2014), Mohammed *et al.* (2014). revealed a significant effect of the project on participants 'income, assets and poverty status.

2.2 Empirical Review of Past Studies

2.2.1 Socio-economic characteristics of cereal crop farmers

Age

Falanta and Bengasi (2018) revealed that, a significant proportion of farmers were between 36 and 64 years indicating that the farmers were mainly middle aged who were in their economically active stage and responsible for decision making, as such, can undergo the stress and has the ability to accept or reject an innovation which can affect productivity of the natives'. Their findings agree with Mwasha (2016) who opined that the age of a person usually is a factor that can explain the level of production and efficiency; it influences individual's experience, wealth and decision-making especially when they are in their active stage. In pursuit for improve economic activities by satisfing their basic needs. Usually older farmers are less likely to explore

new sources of information and thus less likely to depend on multiple sources. It is assumed that increase in age would have influence on access to different sources of information (Imo, 2017).

Gender

From the work of Ogunmefun and Achike (2015) out of eighty (80) farmers interviewed, 55 were male farmers representing 68.8% of the total population while 16 were female farmers representing 31.3%. In a society where women are mostly not allowed to own land and other fixed assets, men have more access to own these fixed assets, which therefore gives them (men) a huge advantage over their counterparts (women) Ogunmefun and Achike, (2015), Mustapha *et al.* (2012), also showed that majoritys of the rural farmers investigated were males, while female constitutes only 37.80% of the respondents. This implies that gender is a significant factor in agriculture because of its vital role in determining farming activities in the study area.

Marital Status

The work of Ogunmefun and Achike (2015) showed that population of the respondents that were married was the highest (81.3%) while unmarried and widowed respondents were 50% and 13.8% respectively. This was in agreement with the work of Ugwoke, Adesope and Ibe (2005) that about 53% of their respondents were either married or widowed. They noted that young people in the rural areas get married earlier than their peers in urban centers. This tendency to marry early helps in building a virile farming population. This tends to agree with the assertion of Perez-Morales (1990) who noted that young people in rural areas get married earlier than their peers in urban centers and also become involved in adult responsibilities before urban youth.

Education

Education is associated with adoption because it is believed to increase farmers' ability to obtain, and analyze information that helps farmers to make appropriate decision. In almost every adoption study, education of the farmer is considered to positively influence the farmer's likelihood of adopting a new technology or practice because farmers with better education have more exposure to new ideas and information, and thus have better knowledge to effectively analyze and use available information (Kassie *et al*. 2013; Prokopy *et al*. 2008). While most studies consider education in terms of number of years of formal education, the categorization of education by Baumgart-Getz *et al*. (2012) seems more appropriate: in contrast to formal education, it reflects knowledge farmers attain through other means such as extension programmes, workshops, and field days. Solomon (2008) indicated positive relationship between education and efficient utilization of production inputs.

Household size

Studies by Mustapha *et al.* (2012) show that most (42.20%) of the respondents had household size of 5-9 members. This implies that, there would be enough work force to supply the needed labour in farming activities (for example soya bean production). The mean household size of the respondents from the work of Nwaiwu (2015) was 5 persons which agree with the findings of Mustapha, *et al*. (2012).

Experience in farming

It is assumed that farmers with long years of experience should be more efficient and their chances of adapting to the resuscitation and expansion of grazing reserves are higher than farmers with little years of experience (Onubuogu *et al*., 2014). Deressa *et al*. (2008) agrees that farmers with high years of farming experience would be more efficient, have better knowledge

of farming conditions and support enclosed system of grazing and expected to adapt effectively to the resuscitation and expansion of grazing reserves. Also findings of Esiobu *et al*. (2014) accepts that previous experience in agribusiness enable farmers to set realistic time and cost targets, allocate, combine, utilize resources efficiently, identify production and marketing risks.

Farm size

Farm size of cereal crop producers can either enhance their food security or poverty status. Farm size refers to the size of land cultivated by farmers. Pulido and Bocco (2014) in their study deduced that larger farm size owners were much more motivated to adopt improved farm management practices in other to enhance their productivity. However, the work of Nwaiwu (2015) suggest that majority (74.9%) had farm sizes less than 1 hectare

Land acquisition

This variable indicates wether cereal crop producers rented, bought, or inherited land for agricultural production. Literature by Kamau *et al*. (2014) reported that land ownership and farm size contributed positively in farmers' efficient utilization of improved production resources. Kamau *et al.* (2014) showed that farmers that owned parcels of land on which they farmed were more productive than non-landowning farming households. This is because they were ready to make huge investments on such land through the adoption of new technological packages to enhance productivity levels.

Extension contact

According to Mohammed (2014), extension information influences the rate and use of improved methods of cereal crop production. Respondents with extension information can obtain process

and use information relevant to cereal crop production to better their livelihoods, reduce poverty and increase income than respondents without extension information.

Occupation

Agriculture is the mainstay of the people living in the rural areas and so farming is the major occupation in the rural areas. As a result of high income variability of farm income of rural farmers which is attributed to the risks they routinely face, some of these rural farmers engage inmultiple job holdings to ensure steady flow of income into their household (Ogunmefun and Achike, 2015). Ogunmefun and Achike (2015) further showed in their work that respondents who depended on farming alone were equal to those with other occupation including farming. This shows that farmers in their bid to reduce income risks engage in other secondary activities like office work, petty trade, crafts and service works. This was contrary to the finding of Nwaiwu (2015) which showed that more than half (62%) of the respondents had farming as their major occupation, while 38% were involved in diverse non-farming activities as their major occupation in addition to farming.

Credit sources

Access to credit and savings plays an important role in efficient utilization of rice production inputs (Sanginga and Woomer, 2009). Credit access facilitates purchase of inputs especially improved local seed varieties, organic fertilizers and labour (Geta *et al*., 2013 and Teklewold *et al*., 2013). Capital and risk constraints are key factors that limit the efficient utilization of rice production inputs by small scale farmers. In line with the, studies conducted by different authors such as Kansiime and Wambugu (2014) also found that the use of credit had positive and significant influence on adoption and intensity of adoption of the technologies.

Membership of cooperative society

Membership of farmers' associations has an influence on the level of production efficiency of the farmer. In their comparative analysis of technical efficiency in swamp and upland rice, Idiong *et al*. (2015) observed that membership of association was positively related to efficiency, and thus resulted in increased output. Membership of association provides a network connection among farmers which lead to mutual commitment (Adeola *et al*., 2011). It affords the farmers access to soft loans and productive inputs such as improved seeds and fertilizer which are better sought by group rather than individuals (Shehu *et al*., 2010; Okike, 2014).

2.2.2 Factors affecting food security and poverty status of rural households

Abdullahi *et al*. (2017) identified a number of factors that influence household food security including household assets; home ownership; household saving; financial constraints; access to credit; education; ownership of livestock; jobs loss and low level of income; knowledge of the household about food storage, processing, nutrition and management of illness; corruption, fiscal imprudence, huge debts and policy inconsistency; non-farm work; gender of the household head, size of the family, cultivated land size, fertility of soil, irrigation access, number of extension visits, fertilizer use and improved seed; remittances and access to market information, and age of the household head; dependency ratio, electricity connection, irrigation availability; monthly income, structure of the family and infrastructural availability.

In a study conducted by Arene and Anyaeji (2010) on the determinants of household food security in Nigeria in which logistic regression model was employed, it was found that about 60% of the households were food insecure. Results revealed income and household head age to be the most significant factors determining food security. Similarly the factors influencing

household food security in Nigeria were examined by Amaza *et al.* (2014) using logistic regression methodology. Results of the study revealed that household size is the key determinant of food security, and that food insecurity increases with the increase in the number of family members and vice versa. Haile *et al.* (2015) probed the determinants of food insecurity by employing logistic regression methodology on data collected from the household. Also, the factors held accountable for food security are farm size, ownership of ox, use of fertilizer, household head education, the size of the household and household per capita production. Study conducted by Guo (2013) show that household assets have a significant association with food security, in the presence of household assets, income's effect on food security decreases. In addition, the significant interaction terms of income loss and household assets indicate that assets provide resources to smooth food consumption. Nelson *et al*. (2015) examined factors that influence household food security among smallholder farmers in Mudzi district of Zimbabwe. The results showed that household dietary diversity is influenced by the age and education of the household head, household labour and size, livestock ownership, access to market information and remittances. Linear regression showed that labour, education of the household head, household size, remittances, livestock ownership and access to market information all affect household food security.

De Cock *et al.* (2013) examined the food security situation in Limpopo Province. Both qualitative and quantitative data were utilized for the purpose of analysis. The study found that 53% of the rural households were food insecure. Important determinants were human capital (education), household size, dependency ratio, household income and the area in which the study was undertaken. Bogale (2012) examined the factors which determine the household level of susceptibility to food insecurity from 277 randomly selected household in Ethiopia. Result

showed that, the size of the family, cultivated land size, the fertility of soil, irrigation access and number of extension visits, fertilizer use and improved seed.

According to Owusu *et al*. (2017) non-farm work affect household food security in Ghana and the result of the study supported the widely accepted view about non-farm income, that it adds to eradication of poverty, while Mango *et al*. (2014) investigated factors affecting household food security in district Mudzi of Zimbabwe, age of the household head, education of household head, household labour size, and ownership of livestock, remittances and access to market information were found to be positively related to household food security.

Jebran *et al*. (2016) posited that remittances one of the important source of income and external finances for many poor people across developing countries and a promising source of economic growth. The author posited that majority of the people (at least one member from each family) were outside of the home and doing jobs in different foreign countries, especially in Gulf region. Every year they send a lot of money to home country. In a study by Nyikahadzoi *et al*. (2015), the effect of remittances was found significant. People receiving remittances were found to be food secure, while those who do not receive remittances were food insecure. Remittances provide an alternative form of income (Nyikahadzoi *et al*. 2012). Those households who receive remittances can purchase a variety of foods and are food secure.

2.2.3 Socio-economic determinants of food security status of cereal crop farmers

Determinants of food security and agricultural productivity are closely related in a country like Nigeria with a very large rural and agrarian population. Therefore, factors that affect the agricultural industry also have direct effect on food security in Nigeria,

(i) land and water related factors such as pollution, desertification, and erosion (Akinyosoye, 2000; Adejoh, 2009; Idumah, 2006),

(ii) climatic factors, particularly limate change leading to adverse and inconsistent weather patterns (Adewuyi, 2014),

(iii) agronomic factors mainly related to the scarcity and high cost of quality inputs (Adejoh, 2009;)

(iv) farm management factors which emphasize the production technologies as well as the relevance of cropping patterns used for particular crops (Oseni 2001),

(v) factors related to poor supporting infrastructure including inadequate storage and marketing facilities, inadequate extension services, poorly organized rural input, output and financial markets, and substandard rural infrastructure including poor feeder roads and limited access to clean potable water, good health services, electricity, telephone and educational facilities (Fasoranti, 2006; Yusuf *et al.*, 2009; Adejoh, 2009).

(vi) Policy related factors where poorly conceived, poorly funded and inconsistent government policy add another layer of constraints to the agricultural industry and reduce the productivity of poor farmers (Adewuyi, 2014). A related macro factor is trade liberalization because globalization makes it difficult for developing countries to develop an appropriate apparatus for equitable food production and distribution (Usman and Ijaiya, 2010).

2.2.4 Factors influencing the output of cereal crop farmers

Urgessa (2015) reported that in African agriculture, the literature stated few factors influencing agricultural output, fertilizer, labour inputs, cultivated land area or farm size, seeds, animal and tractor power etc.

Chemical fertilizer: A soil which has a high production potential and which at the same time is fertile can naturally produce high yields. Binamet *et al*. (2004) found that farmers who are located in more fertile regions perform significantly better than those located in less fertile regions. Tchale and Sauer (2017) results also show that high levels of technical efficiency are obtained when farmers use integrated soil fertility options compared to the use of inorganic fertilizer only. Therefore, fertilizer appears to be the most important factor influencing output levels.

Labour: Most of African agriculture is traditional and characterized by labour intensive production and excess demand for labour often occurs during periods of land preparation, weeding and harvesting. Agricultural labour consists of two categories, namely hired labour and family labour. According to Urgessa (2015), the causes of labour shortages in less developed countries are largely due to the migration of labour from rural to urban areas, labour is normally measured in man-days, man hours or in value terms. Labour availability is another often-mentioned variable affecting farmers' decisions concerning the adoption of new agricultural products or inputs. Most empirical studies found that the estimated coefficient for labour was positive and statistically significant, which implies that labour increases the level of production and output. This means that the larger the family size with effective members, the more labour is available for farming operations, thus increasing the production of farmers. On contrast, over utilization of labour input negatively affects farm production (Tchale and Sauer, 2017).

Farm size: Land in agricultural production is quite heterogeneous in terms of soil size, soil type, associated soil characteristics and other related factors within developing countries. Failing to account for these differences would lead to a biased measure of the land input as well as output levels (Nehring *et al*., 2016). The majority of studies of agricultural productivity in developing countries support the view that there is an inverse relationship between productivity and farm size. This may be a result of market imperfections, such as missing rural labour markets. Literature suggests that land has a major influence on production since its estimated coefficient is positive in most studies; for instance, Mushunje *et al*. (2011) study on relative technical efficiency of cotton farmers in Manicaland Province of Zimbabwe, found positive coefficients in land significant at all levels. This shows positive influence of land on agricultural production. Most literatures show a positive relationship with output. However, producing farm outputs in uneconomic region or zone found to have negative correlation with output (Chaudhry, 2016).

In a study conducted by Obasi *et al.* (2013) on factors influencing the levels of output among arable crop farmers in Imo State, Nigeria, the analysis shows that educational level, farming experience, farm size, extension contact and labour had positive and significant relationships with output. The authors suggested that total factor productivity will increase significantly if these factors are increased above their present levels of use and that it is expected that productivity will increase if more experienced and educated farmers cultivate greater hectares of farm land. On the other hand, age, planting materials and chemical fertilizer are inversely related to productivity. This suggests that if these factors were increased above their present levels, productivity will decrease significantly. This is expected if aged and weak farmers are involved in agricultural production. Also, coefficient of household size was found to be negative and statistically insignificant. This suggests that the negative relationship between productivity and

household size could be attributed to error. However, productivity tends to decrease if household size adds more to the production cost than it adds to the value of output.

2.2.5 Constraints associated with cereal crop production in Nigeria

(i) Illiteracy

Majority of Nigerian farmers cannot read and write which impede their ability to adopt new technologies that could enhance production of cereal crops. Making basic education free and compulsory will go a long way in solving this problem. Many state governments like Niger state have taken a bold step in this direction.

(ii) Tools

Farm operations from land clearing to crop harvesting and processing are carried out by hand using simple tools such as hoe, cutlass, axe, sickle and other local farm implements by the majority of Nigeria farmers. To enhance cereal production in Nigeria, modern farm implements such as tractor should be used to reduce drudgery associated with simple farm tools and to increase size per farmer. Both state and federal government should empower the farmers by giving them credit facilities and subsidizing the modern agricultural tools.

(iii) Finance

Most traditional farms have inadequate capital for the purchase of costly inputs such as farm machinery, fertilizer, herbicide and pesticide which contribute to low cereals production in Nigeria. Just as stated earlier, timely provision of fund to purchase the above inputs will definitely ameliorate this problem.

(iv) Cropping system

The term cropping system' is used to describe the pattern in which crops are grown in a given area over a period of time and includes the technical and managerial resources utilized

(Onwueme and Sinha, 2012). Most Nigeria farms practice mixed cropping which do not permit the use of modern implements and agro chemical like herbicides. In order to enhance productivity of cereal crops in Nigeria, effort should be made to encourage farmers to go into large scale sole cropping to enhance the use of agro-chemicals like herbicide

(v) Poor storage facilities

Often, Nigeria farmers are forced to sell their produce at cheaper prices during the harvest period because of lack of storage facilities than the appreciable prices during off season. Farmers do not seem to gain from the farming, as selling price is often lower than the production price and therefore may not encourage producing more on the subsequent seasons

(vi) Weed

Weeds were reported by Olabande (2017) as the most underestimated pests in tropical agriculture. Uncontrolled weed in cereal farms could lead to 100 (%) yield drop, as weeds compete with plants for nutrients, space, light and even water. Weed creates major problems across most of Africa and part of Asia and it is among the most important weed of the cereals in Nigeria.

It was reported by Saureborn (2014) that about 21 million hectares of cereal in Africa are estimated to be infested by striga, leading to an estimated annual grain loss of 4.1 million tons in 1990. Striga causes a devastating effect on cereal crops such as maize, sorghum, millet and rice in Nigeria. It infests an estimated two thirds of the 73 million hectares devoted to cereal crop in Africa, resulting in crop losses of up to 70% among subsistence farmers (Ciotola *et al.*, 2013). Ciotola *et al.* (2013) stated that striga accounts for about 4.1 million tonnes losses in cereals yield each year and is considered by many experts to be the greatest obstacle to food

production in Africa. Striga is one of the major reasons that the productivity of cereals like pearl millet has remained at subsistence levels for so many years (IAPPS, 2012).Weeds also increase production costs in most cereal fields and crop yield are often reduced drastically as result of delayed weeding due to competition for labour atthe early stage of crop growth.

2.3 Theoretical Framework

2.3.1 Theory of social change

Rogers (1995) posited that social change is the process through which significant alteration occurs in structure and function of the society. Social change may assume either of the following:

a. Modification in human attitudes and behavior pattern as a result of education. Example, when a farmer comes to develop a more favourable attitude towards specific innovation as a result of extension activities; their active participation in the knowledge transfer process and therefore decide to change their farming system by incorporating the new innovation

b. Alteration in social conditions as a result of changes in policies of a social organization e.g. if the government decides to institute free and compulsory primary education, this new policy will bring changes in each family and in the entire society, such changes may range from loss of part of the family's labour supplied by the children, to changes in values with respect to the worth of the western education in the society as a whole.

c. Effecting reforms in major legal and functional systems of a society e.g. whenever laws are passed, they call for changes in the way of life of people and this calls for adjustments.

Social change pervades all aspects of social life and may manifest as:

1. Economic Change: this is the change which occurs in the mode of production, economic relations and status of people in the society e.g. industrialization, production of crops for the market rather than home consumption or the finding of an important mineral in commercial quantities may bring about increased incomes, employment opportunities, and a general change in attitude in status and social relations as a result of unequal access to surplus values within the society.

2. Political Change: this deals with the change in distribution and operating mechanisms of social and political power within the social system

3. Technological Change: technology entails ways of applying scientific and other organized knowledge to practical task. Technological change therefore is a continuous process of change within technical, material and physical practices in a culture.

4. Cultural Change: this refers changes in the non-material aspects of culture. The change from the traditional way of worship which entailed the recognition of several gods (polytheism) to Christianity and Islam which emphasize on God (Monotheism).

5. Behavioural Change: behavioral change is regarded as part of cultural change but it specifically embraces changes arising from the influence of education on the attitude and overt reactions of people.

Social change may be planned or unplanned (accidental). Planned change entails the direct human intervention in the shaping and direction of change towards some predefined goals. Planned change entails the direct human intervention in the shaping and direction of change towards a defined goal (Salawu, 2007). In case of Fadama, it is more of a planned change because there are mission statements to be accomplished; this hereby served as a guide to the

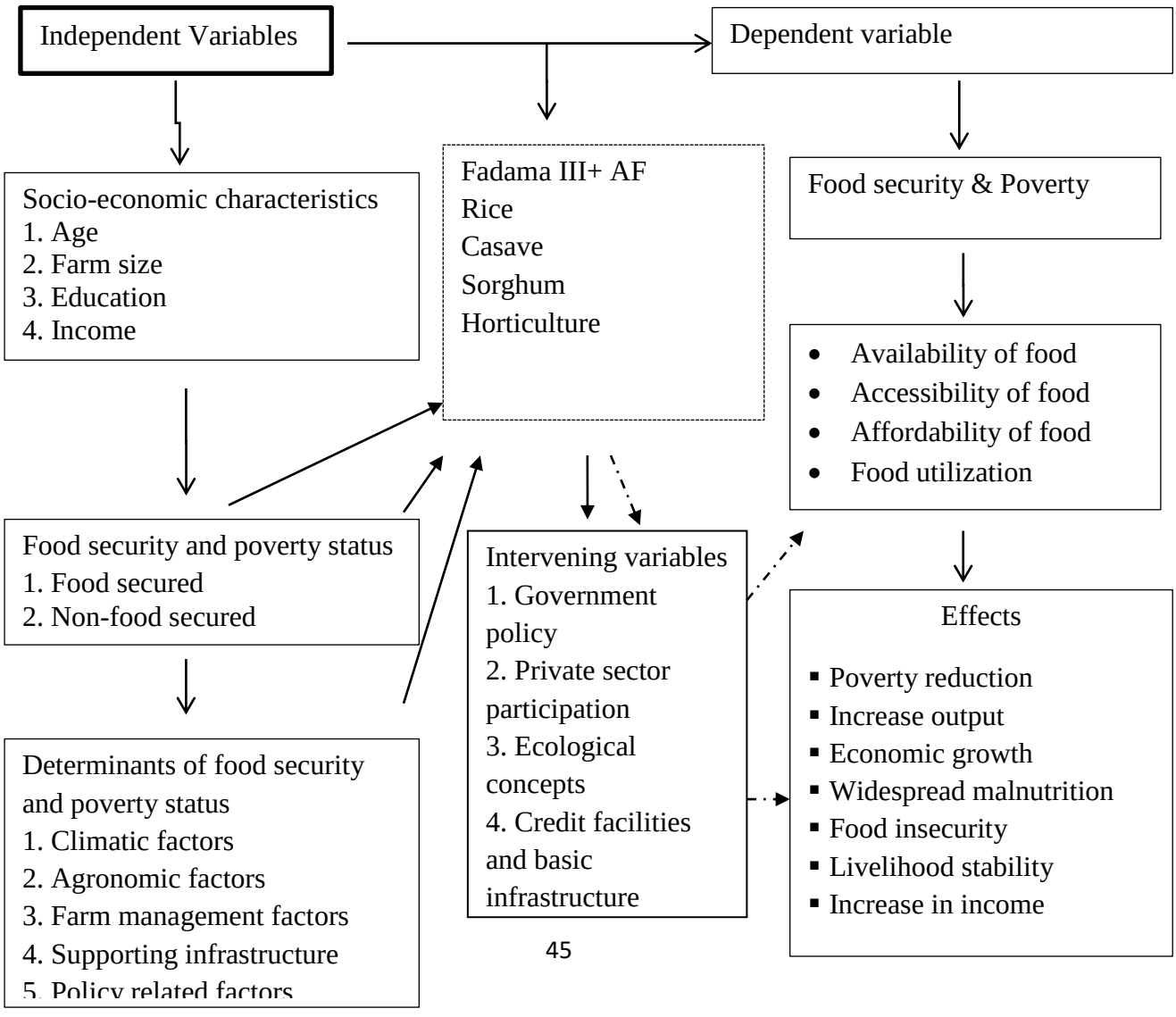
government of Nigeria and its partners in designing the project cycle. That might be reason the project adopted the use of a participatory approach in delivering its services to the farmers. Unplanned change on the other hand is usually very costly as it carries with it no desirable attributes. Change may be total or segmental in its coverage. Social change impinges on the society as well as on the individual. Social change has been defined by Ekong (2005) as the process by which alteration occurs in the structure and function of a social system". Social change on the other hand could mean large number of persons engaging in group activities, interactions and relationships when viewed within the context of a social system. Social change theorists believe that for change to take place, societies have to move from the traditional to modern level. It is assumed that embedded in traditional societies are barriers that prevent them from development. Thus, for societies to develop, it has to undergo changes. The assumption is that economic development would not be achieved unless these barriers are removed. To enhance development of the individual and society, services have to be created, hence the creation of social programmes. For example, most of the innovations introduced to these *Fadama* farmers are just the improvements of their social methods, hence, the quick adoption by most of the *Fadama* farmers. Changes are considered as social changes only when their widespread use affect societal pattern of daily living and the structure of the institution. Thus, the theory of social change was used to examine the relationship between beneficiaries, farmers' socio economic, and cultural attributes which is necessary in explaining the significance of *fadama* III+ additional financing on food security and poverty status of its cereal crops farmers' in Niger State.

2.4 Conceptual Fram ework

Explanation of the conceptual framework: The conceptual frame work was based on the premise that, cereal crop farmers under *fadama* III+ would utilize the financial assistance from the fadama project to improve their food security status (dependent variable). Through the influence of socio economic variables and institutional factors (independent variables) assess the food security and poverty status of the respondents, estimates the determinants of food security and poverty status, effect of food security and poverty status on the output of cereal crop farmers and constraints faced by cereal farmers in the study area.

The result of the interaction is expected to bring an improved level of output for the cereal crop farmers. The conceptual framework highlights the interactions in the process with regard to relationship between the categories of independent variables and their components. The more eduated and exposed a farmer is the better he/she achieves food security to enhance his/her livelihood status. This is because an enlightened individual has a good understanding of the strategies to achieve food security and the benefits of *fadama* III+ additional financing. Farmers who have achieved higher income status due to *fadama* III+ intervention would also escape the poverty line and achieve food security.

When farmers are faced with a lot of challenges under the *fadama* III+ additional financing project the availability, accessibility, affordability of cereals would be high. The intervening variables such as government policy, availability of credit facilities and inputs, private sector participation, individual knowledge and understanding of ecological concepts as well as increase in income would stabilize cereal production towards achieving food security and reducing the incidence of poverty among respondents.


Independent Variables
Dependent variable
Socio-economic characteristics
1. Age
2. Farm size
3. Education
4. Income
Fadama III+ AF
Rice
Casave
Sorghum
Horticulture
Food security & Poverty
Availability of food
Accessibility of food
Affordability of food
Food utilization
Food security and poverty status
1. Food secured
2. Non-food secured
Intervening variables
1. Government policy
2. Private sector participation
3. Ecological concepts
4. Credit facilities and basic infrastructure
Effects
Poverty reduction
Increase output
Economic growth
Widespread malnutrition
Food insecurity
Livelihood stability
Increase in income
Determinants of food security and poverty status
1. Climatic factors
2. Agronomic factors
3. Farm management factors
4. Supporting infrastructure
5. Policy related factors

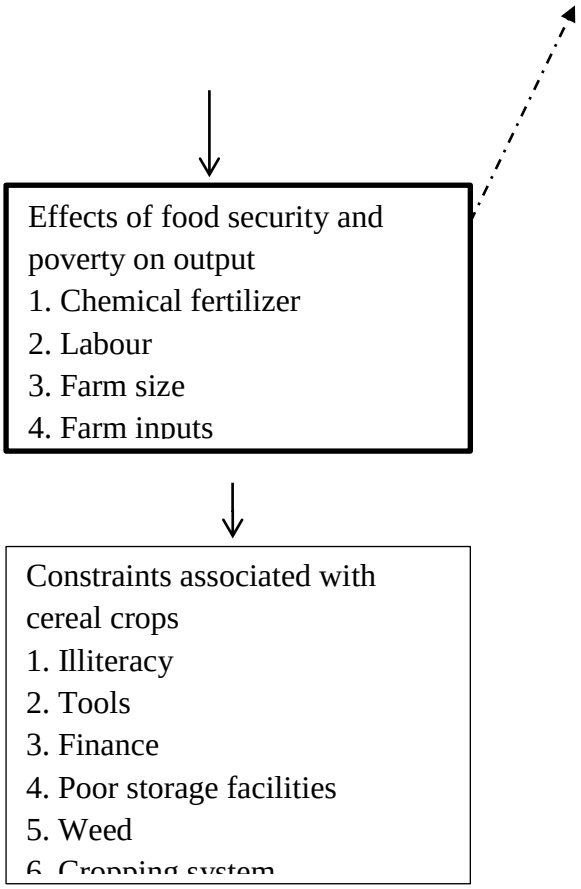


Figure 2.4: Conceptual framework for the assessment of food security and poverty status of cereal crop farmers under fadama III+ additional finacing in Niger State, Nigeria. -----▶ Indirect
Source: Author's Design (2019) ——▶ Direct

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The study was undertaken in selected Local Government Areas (LGAs) of Niger State, Nigeria. Niger State is located between Latitudes $8^0$22'N and $11^0$30'N and Longitudes $3^0$30'E and $7^0$20'E.

The State is bordered by Zamfara and Kebbi States in the North and North-west respectively, Kogi State and Kwara State in the South and South-west respectively; while Kaduna State and the Federal Capital Territory, Abuja, border the State to the Northeast and South east respectively. The State shares an international boundary with the Republic of Benin at Babanna, in Borgu LGA. Currently, the State covers an estimated total land area of 74.244sq.km, which is about 8% of Nigeria's total land area. This makes the State the largest in the Country.

The population of the State is 3,950,249, comprising 2,082,725 males and 1,867,524 females (National Population Commission (NPC), 2006). The projected population of the State as at 2016 was 5,556,200 (United Nations Population Fund (UNPF), (2016). The State is divided into three agricultural Zones, namely: Zone 1, with headquarters at Bida, Zone II, with headquarters at Kuta and Zone III, with headquarters at Kontagora. The Zonal L.G.A. distribution comprise: Zone 1-Mokwa, Edati, Lavun, Gbako, Bida, Katcha, Agaie and Lapai; Zone II- Suleja, Tafa, Paikoro, Chanchaga, Bosso, Gurara, Shiroro, Munya and Rafi and Zone III - Wushishi, Mariga, Magama, Mashegu, Agwara, Kontagora and Rijau.

The average annual rainfall in the State is 1,219 mm. The dry season is between November and March. Temperature is fairly regular and ranges from 26.1^0C (June – February) to 30.3^0C (March – April). These soil types support sustainable production of arable crops. The major spoken languages are Nupe, Gbagyi and Hausa, while the major occupation of the people is farming. Major crops cultivated include rice, guinea corn, maize, yam, beans, groundnut, and sugarcane (www.nigerState.gov.ng). The State has large water bodies (River Niger and River Kaduna) with numerous tributaries, as well as lakes and dams (Shiroro, Kainji and Jebba) which make it suitable for the cultivation of irrigated crops such as rice, sugarcane, vegetables. It is also good for (livestock rearing and fishing activities (International Rice Research Institute (IRRI) 2000).

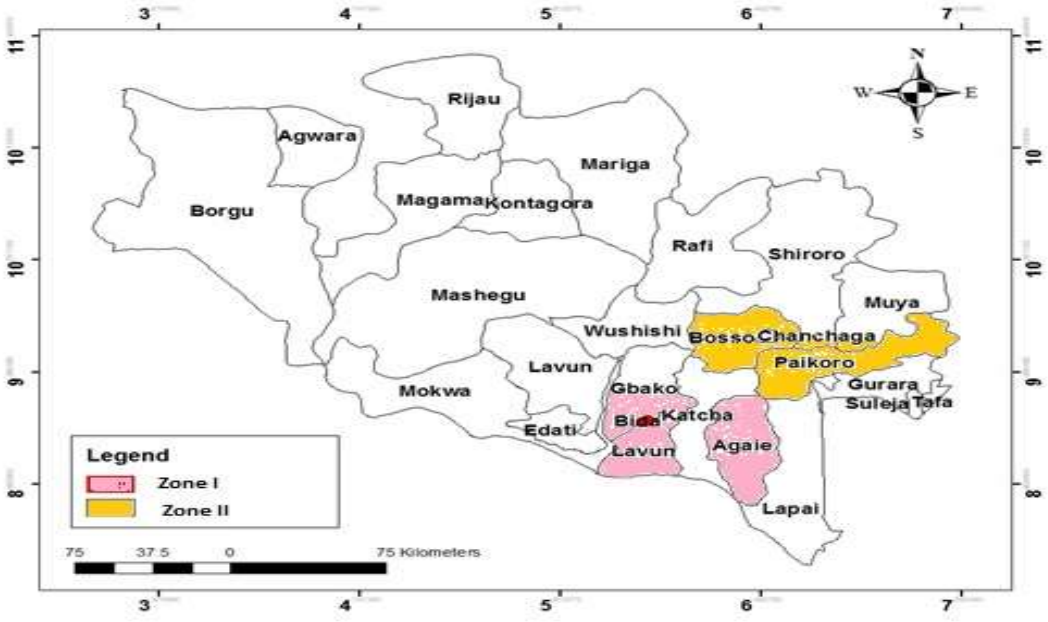


Figure 3.1: Map of Niger State showing the study area

3.2 Sampling Procedure and Sample Size

A multi-stage sampling procedure was used to select respondents for the study. In the first stage, Niger state was selected based on its active participation in the fadama III+ additional financing. The second stage involved the selection of three (3) Local Government Areas (LGAs) based on farmers active participation and contribution in *Fadama* III+Additional Financing Programme. The third stage involved the random selection of four (4) villages from each of the LGAs, while the last stage involved the selection of 207 farmers proportionately to the size of the population from the villages based on sample frame of 810 respondents. The list of registered farmers under *Fadama* III+ AF was obtained from Niger State *Fadama* Coordination office Minna. The total respondents sampled were derived using Taro Yamane formula as adopted by Tuedogheye (2015) at 0.6% precision level and 95% confidence interval. The formula is given as,

$$n = \frac{N}{1+N(e)^2} \quad (3.1)$$

Where;

n= sample size,

N= the finite population,

e = limit of tolerable error at 0.06 probability level and

1= unity.

Table 3.1: Sample outlay of registered farmers under FADAMA III+A.F

LGA	Production Cluster	Production Group	Member	Sample Size
Wushishi	Magbayie	10	100	26
	Wusu	10	100	26
	Tsram	8	80	21
	Lumu	10	100	26
Bosso	Bosso	6	60	15
	Sanasi	8	80	21
	Lepma	4	40	10
	Emagi	5	50	13
Paikoro	Kpakuru	7	70	17
	Shidna	7	70	17
	Kwakuti	6	60	15
Total		81	810	207

Source: Niger State *FADAMA* Coordination Office Minna (2019).

3.3 Method of Data Collection

Primary data was used for the study. Data was collected by the researcher with trained enumerators using well-structured questionnaire.

3.4 Measurement of Variable

3.4.1 Dependent variable

The dependent variable for the study is food security and poverty status of the household; this was determined by considering per capita monthly expenditure of the household. However, a

food insecured household is that whose per capital food expenditure falls below two- third of the monthly per capita food expenditure

3.4.2 Independent Variables

i. **Age:** Generally, this is defined as the length of time (in years) a person has lived or existed. The age of the *Fadama* Farmers was measured in years as given by the respondents.

ii. **Education:** Education refers to the acquisition of knowledge, abilities, skills and instructions through training obtained from school or at home, formal or informal system. This was measured as numbers of years spent in the formal educational system by the *Fadama* Farmers.

iii. **Household Size:** This is defined as the total number of people living in a given household eating from the same pot. Household size was measured by the total number of people the *Fadama* Farmers is feeding and taking care of. These include the husband, children and any other dependent living together.

iv. **Marital Status:** This is a condition or a state of being married or unmarried as indicated by the *Fadama* Farmers. The marital status of the *Fadama* Farmers was measured as being single, married, divorced and widowed.

v. **Farm Size:** The *Fadama* Farmers farm size was measured in hectares of land cultivated during the last cropping season as given by the respondents.

vi. **Land Ownership:** The variable was represented by the ownership status of the farm land used by the farmers borrowed, lease, inherited out-rightly purchased.

vii. **Income:** Income, in this context, refers to the amount of money farmer obtained per annum. This was measured in naira.

viii. **Access to Credit:** This is the access to formal sources of credit by farmers for the purpose of farming. This was determined by knowing how much of the credit gets to the farmers. It was measured in Naira.

ix. **Membership of Association:** This answered the question in years. That is the number of years the farmers have being in the group.

x. **Type of cereal gr**own-the type cereal grown was known/obtained by asking the respondents t**o select from cereal crops mostly grown in the study area. This was measured in number.**

xi. **Distance to farm: This refers to the distance between farmers' house and farm. Farm distance is measured in kilometre.**

xii. **Constraint faced by *fadama* beneficiaries-this was achieved using** 3-point Likert rating Type scale of Very serious = 3; Serious = 2 and Not serious = 1. This was added together i.e 3+2+1 =6 and divided by 3 to arrive at a mean point of 2.0 that was considered as cut off mean for categorization into serious constraints (≥ 2.0) while less than (<) 2.0 was seen as not serious constraints.

3.5 Method of Data Analysis

Descriptive statistics, Foster, Greer and Thorbeeke index, Food security index, multiple regression and logit regression were employed to analyze the data elicited from the field. However, 3- point Likert Type rating scale was used to measure Objective (v) while objectives (i), was achieved using descriptive statistics such as frequency distributions and mean. Foster,

Greer and Thorbeeke index and Food security index was used to achieve objective (ii), objective (iii) and (iv) was achieved using logit regression model, multiple regression analysis was used to achieve objective (v)

3.6 Specification of Models

3.6.1 Foster, Greer and Thorbeeke index

Foster, Greer and Thorbeeke index was used to achieve objective (iii). Foster, Greer and Thorbeeke index was used to determine the poverty status of the farmers. The models used by de January (2010) FGT poverty index is given as:

$$P_a = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^{\propto} \quad (3.2)$$

Pα = Poverty index (less than 1 is considered poor while 1 and above is non-poor

N = total population

q = the number of poor households below the poverty line

z = the poverty line for the h ousehold.

yi = household income

$\sum$ = summation

$\propto$=poverty aversion parameter which takes the value 0, 1, 2 representing incidence, depth and severity of the poverty respectively.

3.6.2 The FGT measure for the i^{th} sub-group (Pαi) is given as

$$P_{ai} = \frac{1}{n}\sum_{i-1}^{q}\left[(z-y)/_{Z}\right]^{a} \quad (3.3)$$

Where a = 0, $P_o = \frac{1}{n}\sum_{i-1}^{q}\left[(z-y)/_{Z}\right]^{0} = \frac{q}{n}$ →Poverty incidence or head count

Where a = 1, $P_1 = \frac{1}{n}\sum_{i-1}^{q}\left[(z-y)/_{Z}\right]^{1} \rightarrow Poverty\ depth$

Where a = 2, $P_2 = \frac{1}{n}\sum_{i-1}^{q}\left[(z-y)/_{Z}\right]^{2}$ →Poverty severity

Where

a = degree of poverty aversion

n = number of households in a group

q = the number of poor households

z = poverty line

y the per capita income (PCI) of the ith household.

Total per-capita income TPCI = Summation of PCI

Mean TPCI = TPCI/ Total number of household

Poverty line PL = $\frac{2}{3}$ x MTPC

3.6.3 Logit regression

Logit regression model was employed to achieve objective (iii) and (iv). The regression model is specified explicitly as follows:

$$Y = \alpha + FS, + MS + AF + EC + FE + CR + EL + \ldots\ldots\ldots + \mu \quad (3.4)$$

Fss = Food security status (Fi $\geq$ 1 = food secured household and Fi $<$ 1 = food insecure household)

MS = Marital status (married=1,otherwise=0)

AF = Age of farmer (years)

EC = Extension contacts (number)

FE = Farming experience (years)

CR = Credit (naira)

EL = Education level (number of years in schooling)

HS = Household size (number)

MA = Membership of association (years)

FS = Farm size (hectares)

CM = Cooperative membership (member=1, otherwisw=0)

$X_1 – X_{10}$ =regression parameters to be estimated,

β_0 = Intercept

μ = error term

3.6.4 Multiple regression model

Ordinary Least Square (OLS) regression analysis was used to determining the factors influencing the output of cereal crops farmers under *Fadama* III AF in the study area.

The model is expressed in implicit as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, \ldots\ldots\ldots\ldots\ldots X_n, \mu) \quad (3.5)$$

The four functional forms namely linear function, Cobb- Douglas (Double- log), Semi-Log and Exponential will be used in testing the variables. The four functional forms in which the data will be fitted are as follows:

1. Linear equation

$$Y = a + MS + AF + EL + HHS + FS + FE + MI + \ldots.. + b_nX_n + e + \ldots + b_nX_n + \quad (3.6)$$

2. Double- log function

$$\text{Log } Y = aMs + Af + El + Hhs + Fs + Fe + M + \ldots.. + b_nX_n + e \ldots \text{ Log } \mu \quad (3.7)$$

3. Semi – log function

$$Y = a + Ms + Af + El + Hhs + Fs + Fe + M + \ldots.. + b_nX_n + \quad (3.8)$$

4. Exponential function

$$\text{Log } Y = a + MS + AF + EL + HHS + FS + FE + MI + \ldots.. + b_nX_n + e \quad (3.9)$$

Where Y_1, MS, AF, EL, HHS, FS, FE, MI, L, MA and EC as defined in the explicit form

Y = Output (kg)

MS =Marital status

AF = Age of farmer (Years),

EDU = Education (Years),

HHS = Household size (Numbers),

FS = Farm size (Hectares),

EXP = Experience of farming (Years),

MI = Modern inputs (yes=1,No=0)

FD = Farm distance (km)

L = Labour (Mandays),

MA = Membership of cooperative (yes= 1, No= 0),

EC = Extension contact (No of visits),

X_1– X_{13} =regression coefficients to be estimated,

a = constant term and

e = error term

3.7 Test of Hypotheses

H_{01} one (1) was tested using correlation analysis while H_{02} two (2) was tested using the t-values from the multiple regression.

3.7.1 Pearson product moment correlation

$$r_{xy} = \sqrt{\frac{N\sum XY - \sum X\sum Y}{[NX^2-(\sum X)^2][NY^2-(\sum X)^2]}} \quad \text{..... (16)}$$

Where: r

N= Number of observations

∑= Summation

X= Independent Variables

Y= Dependent variables

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Socio-Economic Characteristics of Cereal Crops Farmers

This section describes the socio-economic characteristics of cereal crop farmers in the study area. These include gender, age, marital status, education level, household size, farming experience, membership of cooperative, farm size etc. These variables were considered because of their

direct effect on food security and poverty status of cereal crop farmers under *fadama* III+ additional financing.

4.1.1 Age

Age determines the quality of labour supply. It is the number of years someone has lived. The result in Table 4.1 shows that, the mean age of the respondents was 39.4 years. This is an indication that most of the cereal crop farmers were in their active and productive stage. This implies that their food security status will improve and increase while reducing their poverty status. This finding agrees with Mwasha (2016) who posited that age of a person usually is a factor that can explain the level of production and efficiency. It influences individual's experience, wealth and decision-making especially when they are in their active stage.

4.1.2 Gender

Gender is used to differentiate whether individual respondents are male or female. Gender is a determinant factor in farming operation.The result in Table 4.1 shows that (95.7%) of respondents were male while female constitute 4.3%. This finding agrees with Ogunmefun and Achike (2015) which showed that, more male farmers than female were seen in their study, and also that of Mustapha, *et al.* (2012) where by more than 62.20% of the farmers were males. The similarities could be as a result of Nigerian culture where ownership of land favours men more than women and as a result encourages more men to go into farming than women.

4.1.3 Marital Status

Table 4.1 also indicates that (91.3%) of respondents were married, while (8.7%) were single. This result shows that majority of the respondent were married in the study area. The married

respondents are expected to have access to family labour for farming operations which can go along way in boosting farm income and alleviating poverty.

4.1.4 Level of Education

Education is associated with adoption because it is believed to increase farmers' ability to obtain, and analyse information that help them to make appropriate decision. In almost every adoption study, education of the farmer is considered to positively influence the farmer's likelihood of adopting a new technology or practice because farmers with better education have more exposure to new ideas and information, and thus have better knowledge to effectively analyse and use available information (Kassie *et al*., 2013; Prokopy *et al*., 2008).Table 4.1 revealed that,the mean educational level of the farmers was 12.4.This indicates that cereal crop farmers had sufficient knowledge to alleviate poverty status. The findings agree with Nwaiwu (2015) which showed that most of the respondents had formal education. The results also agree with (Fouzai *et al*., 2018.) who argued that higher educational attainment is paramount to realizing fruitful results and sustaining improved agricultural practices.

4.1.5 Household size

In any subsistence farming system, the number of children is a very important factor that determines availability of labour. Household size is the number of people that eat from the same pot. Table 4.1 shows that, the mean household size was 15. This implies that majority of the respondents had large household size, this is in agreement with (Esiobu *et al.,* 2014) who asserted that large household size is proportional to labour availability and it reduces the cost of hired labour. Also, larger households diversify their means of livelihoods which enables them to

make more money. This will likely increase their food security and reduce the prevalence of poverty among them (Mustapha, *et al.* 2012).

4.1.6 Distance between house and farm

Distance to farm refers to the distance between farmers' house and farm. Table 4.1 revealed that 92.3% of respondents had a distance of 1-10km between farmers house and their farm lands. This implies that the cereal crop farmers did not have to embark on long exhaustible trek to access their farms. In addition, 2.4% had a farm distance of 11-20km while 5.3% claim they had more than 20km.

Table 4.1.1: Distribution of respondents according to their socio-economic characteristics

Variables	Frequency	Percentage	Mean
Age			
>30	49	23.7	39.4
31-40	75	36.2	
41-50	53	25.6	
51-60	23	11.1	
>60	7	3.4	
Gender			
Male	198	95.7	
Female	9	4.3	
Marital Status			
Married	189	91.3	
Single	18	8.7	
Level of Education			
1-6	12	5.9	12.4
7-12	65	31.6	
>12	114	55.3	
None	15	7.3	
Household size			
1-5	40	19.3	15.1
6-10	48	23.1	
11-15	36	17.4	
16-20	43	20.8	
Distance between house and farm			
1-10	191	92.3	
11-20	5	2.4	
>20	11	5.3	
Farming experience			
1-10	61	29.5	20.5
11-20	54	26.1	
21-30	63	30.4	
31-40	21	10.1	
>40	8	3.9	
Farm size			
<1-1	22	10.6	4.2
1.01-2.0	39	18.8	
2.01-3.0	37	17.9	
3.01-4	37	17.9	
>4	72	34.9	
Land acquisition			
Individual	28	13.5	
Family	168	79.2	
Community	7	3.4	
Rented	8	3.9	
Income			
<100000	51	24.7	481,034.8
101000-200000	45	21.7	

201000-300000	27	13.4
301000-400000	11	5.3
>400000	72	34.9
Extension contact		
Yes	126	60.9
No	81	39.1

Source: Field survey, 2019.

4.1.7 Farming experience

Farming experience refers to the number of years spend in farming activities. It may be full-time or part-time. It is the act of gaining knowledge through constant practicing of skill, which brings about specialization. Table 4.1 shows that, the mean number of years in farming experience was 20.5 for the cereal crop farmers. This implies, farmers had wealth of experiences over time to manage and adjust to food security challenges. The results agree with Olaoye, (2010) who posited that, experienced farmers have the ability to use modern farming practices geared towards surplus production and read the agricultural environment in term of when to plant and to market their produce. Also findings of Esiobu *et al*. (2014) showed that previous experience in agribusiness enables farmers to set realistic time and cost targets, allocate, combine, utilize resources efficiently, identify production and marketing risks.

4.1.8 Farm size

Farm size refers to the size of land cultivated by farmers.Table 4.1 reveals that, the mean farm size of the cereal crop farmers was 4.2ha Indicating that most of the respondents were small scale farmers. This implies that, yield per hectare may be very low, enhancing poverty among cereal crop farmers. This assertion totally disagrees with Nwaiwu (2015) who had majority (74.9%) of the respondents having farm sizes less than 1 hectare.

4.1.9 Land Acquisition

This variable explains the different methods through which individuals own parcels of land. Table 4.1 indicates that 13.5% of respondents were individual owners of their landed property, 79.2% was owned by families and shared amongst members while 3.4% belonged to the community and 3.9% was rented.

4.1.10 Annual Income from Cereal crop Production

Table 4.1 showed that 24.7% of respondents had annual income less than 100000 naira while 21.7% had annual income between 101000-200000 naira. More so, 13.0% had income between 201000-300000 naira and 5.3% claim to have annual incomes of 301000-400000 naira. However, 34.9% of the cereal crop farmers claimed to have annual incomes above 400000. The mean income of the respondents was 481,034.8 naira. This could be as a result of increase in *fadama* III+ additional financing to boost their food security levels their by reducing poverty to the barest minimum.

4.1.11 Contact with extension agent

Extension service is a channel through which agricultural innovations and information are passed to farmers for improvement in their standard of living, production and productivity. Table 4.1 reveals that the mean contact with extension agent was 2.1. This means famers were been updated about current agricultural innovations, this could increase their food security and reduce poverty. This is in agreement with Muddassir *et al.* (2016) that adequate information through extension service was the major reason for utilization of recommended farming practices or technology. Also Fiaz *et al.* (2016) stressed that self-sufficiency in agriculture could only be achieved by addressing the agricultural problems through effective extension services.

Table 4.1.2: Distribution of respondents according to their institutional characteristics

Variables	Frequency	Percentage	Mean
None	81	39.1	
Occupation			
Farming	191	92.3	
Non-farming	16	7.7	
Access to credit			
Yes	56	27.1	
No	151	72.9	
Years in cooperative			
1-5	76	36.7	6.3
6-10	55	26.6	
>10	32	15.5	
None	44	21.3	

Source: Field survey, 2019.

4.1.12 Occupation

Table 4.1 indicates that 92.8% of respondents had farming as their primary occupation, this implies that majority of respondents in the study area were full time farmers. This finding is in agreement with the report from the International Food Policy Research Institute (IFPRI, 2007) which posits that rural dwellers' major occupation in Nigeria is farming. While, 7.2% of the cereal crop farmers were either civil servants or artisans.

4.1.13 Access to credit

Credit is a form of incentives required to boost production capacity. Table 4.1 reveals that (27.1%) of respondents had access to credit sources while majority (72.9%) could not access different credit platforms to aid or assist in carrying out different farming operations. This finding contradicts studies by Kansiime and Wambugu (2014) which showed that the use of credit plays a significant influence and intensity on agricultural output.

4.1.14 Years in cooperative society

Cooperative membership is often used as a proxy for social capital and can be useful especially when the issues dealt with during meetings with the members are relevant to the challenges they are facing. Agricultural cooperative societies are essential to agricultural development. The result in Table 4 shows that, the mean years (6) yrs in cooperative society implies a healthy and cohesive understanding that affords a network connection among farmers which lead to mutual commitment among them, and thus results in increase in output and decrease in their poverty status hence, improving the quality of their livelihood. This assertions agrees with Adeola *et al.,* (2011) who stated that cooperative membership provides farmers access to soft loans and productive inputs such as improved seeds and fertilizer which are better sought by group rather individuals (Shehu *et al.,* 2010; Okike, 2000). Also, Kassie *et al.* (2015) found that participation in cooperative societies contributed positively by improving farming practices.

4.2 Distribution of Respondents according to their Food Security and Poverty status

4.2.1 Food security status among cereal crop farmers

Results in Table 4.2a shows that 40.1% of the respondents were food secured while more than half of the respondents 59.9% were not food secured. This will ultimately affect their poverty status and in turn malnutrition.This implies that even with the increase in resources toward the

fadama III+ additional financing cereal crop farmers needs and challenges were not adequately addressed in the study area.

Table 4.2.1 Distribution of respondents according to their food security status (N=207)

Food security	Frequency	Percentage
Food secure	83	40.1
Not secure	124	59.9
Total	207	100.0

Sources: Field survey 2019

Table 4.2.2 shows the result of poverty status of cerea lcrop producers in the study area.The total income of the respondents in the study area was ₦85,926,800. The average income of cereal crop farmers was ₦481,034.8 while the poverty line was ₦276,736.9.The numbers of poor household were 86. According to FGT poverty measures, 41.5% of cereal farmers in the study area were living below poverty line, this shows that poverty exist slightly in the study area. The poverty depth was 59.7, implying that 59.7% increase in income is required by the poor farmers to escape from poverty, that is income of cereal crop farmers must be raised by 59.7% to escape poverty. In addition, the severity of poverty was 39.8, this implies that about 39.8% of cereal crop farmers were exremely poor in the study area. The poverty severity takes into account not only the distance separating the poor from the poverty line, but also the inequality among the poor.

Table 4.2.2 Distribution of respondents according to their poverty status (N=207)

Poverty Status	Frequency	Percentage %	
Poor	86	41.5	
Non poor	121	58.5	
Total	207	100	
FGT indices	Head count index	Poverty depth	Poverty severity

Value	41.5	59.7	39.8

Per capital income PCI = Income/household

Total per-capital income TPCI = Summation of PCI

Mean TPCI = TPCI/ Total number of household

Poverty line PL = 2/3 x MTPC

Poverty line =2/3x ₦415,105.3 = ₦276,736.9

4.3.1 Socio-economic determinants of food security status of cereal crop farmers

Results in Table 4.3a shows Logit regression used to estimate the determinants of food security of cereal crop farmers. The results showed Pseudo R^2 of 0.403, implying that about 40.3% of variation in the determinants of cereal crop farmers food security status were explained by the independent variables included in the model, while the remaining 59.7% were due to external factors not captured by the researcher. The chi-squared statistics 63.15 was significant at 15 level of probability indicating fitness of the model.

From the Z values, five out of nine variables included in the model were statistically significant at 1% and 5% respectively. The coefficient of years in school (-0.1309) was negative and significant at 5% probability level, implying that literacy level reduces poverty among farmers and increase their food security status as the gain knowledge, skills and techniques that empowers their standard of living. This finding conforms to Owolabi *et al.* (2016) who stated that education played important roles by advancing the food security status at household level.

Moreso, the coefficient of household size (-0.0879) was also negatively significant at 1% level of probability, implying that increase in household size will reduce the food security status i.e (quality and quantity of food consumed) of the cereal crop farmers and in turn lead to malnutrition as there will be too many hands on poor quantities of food items.

Similarly, the coefficient of years in cooperative (-0.0764) was negatively significant at 5% probability level. This implies that, cooperative benefits, such as inputs and other technical services derived from cooperatives society for improving the food security status of the cereal crop producers were not adequately utilized for optimum yield, which in turn increase the poverty rate in the study area

Results from Table 4.3.1 also revealed that the coefficient of income (2.38E-06) was positively significant at 1% level of probability. This is expected to increase the food security status of household members, while poverty will reduce. This implies that farmers were into different agricultural enterprises apart from cereal production to augment their income level so as to meet up with their feeding needs.

The coefficient of number of extension contact (0.3425) was significant at 1% level of probability. This means that cereal crop producers were well equipped, knowledgeable and informed on latest innovations, proven farm practices that could enable them achieve food security, standard of living and productivity. This finding is in consonance with Fiaz *et al.* (2016) who stated that, self-sufficiency is agriculture could only be achieved by addressing agricultural problems through effective use of extension services.

Table 4.3.1 Socio-economic determinants of food security status of cereal crop farmers

Variable	Coefficient	Std. deviation	Z.value
Constant	1.6474		1.57
Age	0.0259	10.18	1.15
Years in school	-0.13095	4.18	-2.54**
Household size	-0.0879	11.89	-4.96***
Farmsize	0.0335	43.51	0.54
Farming experience	-0.0285	11.20	-1.32
Years in cooperative	-0.0764	6.12	-2.29**
Income	2.38E-06	602748.3	3.34***
N0.ofextension contact	0.3425	2.16	3.35***

Distance covered to farm	-0.03204	7.76	-1.45
PseudoR^2 0.4033			
LR chi^2 63.15			
Likelihood -109.81* **			

Source: Field survey, 2019

Note:

*** = significant at 1% level of probability **=significant at 5% level of probability

4.3.2 Socio-economic determinants of poverty status of cereal crop farmers

Table 4.3.1 showed Logit regression used to estimate the determinants of poverty on cereal crop producers. The results showed Pseudo R^2 of 0.416, implying that 41.6% variation in the determinants of poverty status was explained by the independent variables included in the model, while 58.4% was due to error. However, the chi-squared statistics of 60.97was significant at 1% level of probability implying the fitness of the model.

The Z values shows that five out of nine variables included in the model were statistically significant at 1% and 5% probability level. The coefficient of years in school (-.1220) was negatively and statistically significant at 5% probability level, implying that their educational level was not enough and did not include knowledge on food security hence been affected by poverty.

Moreso, the coefficient of household size (-.0870) was also negative but significant at 1% level of probability. The negative implication of this significance is that increases in the household size of cereal crop producers could reduce the quantity, quality and frequency of food items consumed by members of the family, consequently increasing their poverty status and reducing their food security status.

Similarly, the coefficient of years in cooperative (-.0744) was negatively significant at 5% level. This suggests that cereal farmers could not harness and use the benefits from their cooperative societies despite the number of years spent in cooperative. The implication of this finding is that, weak cooperative societies translates to poor knowledge sharing among farmers and dissemination of relevant information that could be used to achieve certain farm objectives there will be increase in the poverty status of the cereal crop farmers in the study area.

Table 4.3.2 reveal that the coefficient of income (-2.45) was negatively significant at 1% level. It is expected that increase in income should lead to decrease in the poverty status of cereal crop farmers. This implies that accrued income of the farmers was not enough to access and fulfil food and material needs, the multiplier effect of this is increase in poverty status.

Number of extension contact was positively significant at 1% level with a coefficient of (.3250). Extension contact which is the bridge between proven and new agricultural innovations implies that farmers were hands on new information and productive services with extension agents to improve their food security and avert poverty status among them.

4.3.2 Socio-economic determinants of Poverty Status of Cereal crops farmers

Variables	Coefficient	Standard-deviation	Z-value
Constant	1.6792		1.60
Age	.0235	10.68	1.05
Years in school	-.1220	4.18	-2.38**
Household size	-.0870	11.89	-4.93***
Farmsize	.0257	43.51	0.42
Farming experience	-.0261	11.20	-1.21
Years in cooperative	-.0744	6.12	-2.24**
Income	-2.45	602748.3	3.38***
N0.ofextension contact	.3250	2.16	3.19***
Distance covered to farm	-.0332	7.76	-1.52
Pseudo $R^2$0.4165			
LR $chi^2$60.97			
Log likelihood -110.31647			

Source: Field survey, 2019

Note:
*** = significant at 1% level
**= significant at 5% level

4.4 Effects of food security and poverty status on output cereal crop farmers

The result of the multiple regression analysis of the four functional forms showed that the double log function was chosen as the lead equation, due to its number of significant variables with the best of 60.1%. The adjusted coefficient of determination (R^2) is 0.57 indicating that 57% of variation in output realised from cereal crop production is explained by the variations in the specified independent variables. The result showed that there were both positive and negative significant relationships between food security and poverty status on the output of cereal crop producers.

From the t-values six out of thirteen variables included in the model were statistically significant at 1% and 5% respectively. The coefficient of age (-.1014) was negatively significant at 5% level. The coefficient of educational level (.2119) was significant at 1% probability level. This indicates that literacy level of the farmers would result in increase in output because of the knowledge utilised and put to practical use.

More so, the coefficient of household size (.0474) was significant at 10% level of probability. Implying more hands to save the cost of hired labour. The result agrees with Esiobu *et al.* (2014) who asserted that large household size is proportional to labour. Also, larger households are diversifying their means of livelihoods which enables them to make more money, this will likely increase their food security and reduce the prevalence of poverty among them this agrees with the work of Mustapha, *et al.* (2012).

Table 4.4 shows that the coefficient of farm size (.0481) is significant at 5% level. This relationship indicates that, farm size is pivotal to increase and sustainability of cereal crop farmers output in the study area. This implies that, as the farm size of cereal farmers increase for more production in output, poverty would be reduced to the bearest minimum

Furthermore, the coefficient of farming experience (.3139) was significant at 1% probability level. The number of years a farmer spents serves as indication of practical knowledge and skills acquired by the farmers in cereal production. This implies that, a unit increase in the coefficient of farming experience will lead to a 0.31 increase in output of cereal crop producers. This findings agree with Esiobu *et al*. (2014) accepts that previous experience in agribusiness enable farmers to set realistic time and cost targets, allocate, combine, utilize resources efficiently, identify production and marketing risks.

Similarly, Table 4.4 shows that, the coefficient of extension contact (.0871) was significant at 5% level of probability. This shows that, use of extension services in cereal production lead to increase in the food security status and poverty alleviation.

Result in Table 4.4 reveals that, the coefficient of poverty (-.0960) was negatively significant at 1% level of probability. This indication suggest, that the additional financing resources injected

in to the *fadama* III+ has not sufficiently yield positive results especially on the output and income of cereal crop producers. More so, the coefficient of food security (.0854) was positively significant at 5%. This implies that, cereal crop farmers have potentials to attain and sustain food security with reflection and evaluation of the programme on their felt needs.

Table 4.4 Effects of food security and poverty status on output of cereal crop farmers

Variables	Linear	Semi-log	Double-log	Exponential
Gender	-.0241	-.0197	-.0117	-.0010
	(-0.43)	(-0.01)	(-0.18)	(-0.74)
Age	-2.7726	-4.3245	-.1014	-.0670
	(-2.48)**	(-2.28)**	(-2.14)**	(-2.27)**
Education	-1.2462	7.0659	.2119	-.0428
	(-1.13)	(-2.17)**	(2.61)***	(-1.47)
Household size	.1064	1.6579	.0474	.0039
	(0.94)	(1.48)	(1.69)*	(1.33)
Farm size	.3696	2.3105	.0481	.0035
	(1.71)*	(2.83)***	(2.36)**	(0.63)
Farming	.6664	12.3257	.3139	.0165
experience	(17.97)***	(12.48)***	(12.74)***	(16.83)***
Seeds	.0473	3.6221	.1277	.0166
	(0.03)	(0.95)	(1.34)	(0.45)
Labour	-.0409	.3573	.0047	-.0014
	(-0.10)	(0.30)	(0.16)	(-0.13)
Membership of	-.7368	-.6658	-.0156	-.0173
cooperative	(-0.68)	(-0.35)	(-0.33)	(-0.60)
Extension	1.4833	3.8768	.0871	.0335
contact	(1.88)	(2.35)**	(2.12)**	(1.60)
Constant	35.1479	2.1104	2.7328	3.6246
	(8.45)***	(0.22)	(11.35)***	(30.31)***
R-squared	0.7107	0.5932	0.5990	0.6799
Adj R-squared	0.6912	0.5658	0.5719	0.6584
F-value	36.46***	21.65***	22.17***	31.54***

Source: Field survey, 2019

Note:

*** = significant at 1% level

** = significant at 5% level

* = significant at 10% level

Figures in parentheses are t-values of variables measured, indicating significance

4.5 Constraints faced by cereal crop farmers

Table 4.5 showed that problem of road network linking access roads was the major constraints faced by cereal crop farmers with mean value of ($\bar{X}$ =2.58). Farmers also reported that flooding limited their production with a mean value of ($\overline{X}$ =2.38). Lack of credit facilities had mean value of ($\bar{X}$ =2.35), this constraint is well documented and popular among studies in Nigeria. Hussein and Ohlmer (2008) examined the influence of credit constraint on production of farming households. The study found that all inputs except herbicide and land were found to be statistically significant. The result also showed that credit constraint households had lower mean production efficiency. This constrained was followed by high cost of hired labour with mean value of ($\bar{X}$ =2.34) and lack of storage facility with mean value of ($\bar{X}$ =2.27). This implies that cereal crop farmers could be prone to hunger and malnutrition due to lack of appropriate facility to preserve the excess produce for future use. Other challenges of concern in the study area were inadequate irrigation facility and input supply with both mean of ($\bar{X}$ =2.26), inadequate farm land ($\bar{X}$ =2.21), poor fertility of the soil ($\bar{X}$ =2.19) among others. The inference that can be drawn from this finding is that cereal crop producers are faced with several challenges in the study area, which require attention for improved production and poverty reduction.

Table 4.5: Constraints faced by cereal crop farmers under Fadama III + additional financing

Variable	Very severe	Severe	Not severe	Weighted sum	Weighted mean	Rank
Problem of road networks	146 (70.5)	36 (17.4)	25 (12.1)	535	2.58	1st
Flooding	120 (57.9)	46 (22.2)	41 (19.8)	493	2.38	2nd
Lack of credit facilities	121 (58.5)	37 (17.9)	49 (23.6)	486	2.35	3rd
High cost of hired labour	99 (47.8)	80 (38.7)	28 (13.5)	485	2.34	4th
Lack of storage facility	102 (49.2)	59 (28.5)	46 (22.2)	470	2.27	5th
Inadequate irrigation facilities	82 (39.6)	97 (46.8)	28 (13.5)	468	2.26	6th
Inadequate supply of inputs	82 (39.6)	97 (46.9)	28 (13.5)	468	2.26	6th
Inadequate farm land	89 (43.0)	74 (35.8)	44 (21.2)	459	2.21	8th
Poor fertility of the soil	102 (49.2)	43 (20.8)	62 (29.9)	454	2.19	9th
Inadequate improved seed for planting	72 (34.8)	101 (48.8)	34 (16.4)	452	2.18	10th
Problem of weed	92 (44.4)	59 (28.5)	56 (27.1)	450	2.17	11th

Lbourious nature of production	83 (40.1)	73 (35.2)	51 (24.7)	446	2.15	12th
Inadequate information on cereal crops	71 (34.3)	84 (40.6)	52 (25.1)	433	2.09	13th
Incidence of pest and disease	54 (26.1)	111 (53.6)	42 (20.3)	426	2.05	14th
Inadequate extension advisory services	47 (22.7)	86 (41.6)	74 (35.8)	387	1.87	15th

Source: Field survey, 2019

Note: ≥ 2.0 =very severe constraint, < 2.0 = not severe constraint

4.6.0 Test of Hypotheses of the Study

4.6.1 Hypothesis I

The correlation result indicates that, there is significant relationship between years in school, household size and income on food security and poverty status of cereal crop farmers. This implies that years in school, household size and income to a large extent contribute to food security. Therefore, the null hypothesis which states that there is no significant relationship between selected socioeconomic characteristics of the respondents on food security and poverty status was rejected. This result agrees with the finding of Umar, Olaleye and Ndanitsa, (2013) who found that household size to some extent determine the poverty status of most farmers in Niger State. The result also shows that, income is a very essential resource that is required for adequate means of livelihood and poverty alleviation. The result agrees with finding of Umar, Ndanitsa, Mohammed and Tyabo, (2015) who reported that farmers with higher income escaped the poverty line.

Table 4.6.1 Relationship between some selected socio-economic characteristics on food security and poverty status of cereal crop farmers in the study area using correlation

Variables	P	R	Decision
Age	0.7688	0.0206	accept
Years in school	0.0025***	-0.2089	reject
Household size	0.0000***	-0.3062	reject
Farm size	0.6380	0.0329	accept
Farming experience	0.8514	-0.0131	accept
Years in cooperative	0.6426	-0.0326	accept
Income	0.0007***	0.2348	reject

Source: Field Survey, 2019

***Significant at 1%, P= Probability level, R= coefficient

4.6.2 Hypothesis II

$H_{02:}$ There is no significant effect of food security and poverty status on the output of cereal crop farmers in the study area.

The multiple regression results (double log) indicates that age and poverty had negative effect on the output of cereal crop farmers and statistically significant at 5%, 1% probability level respectively while educational level, household size, farm size, farming experience, extension contact and food security had positive effect on the output of cereal crop producers and statistically significant at 1%, 10%, 5%, 1%, 5%, 5% level of probability. Therefore, the null hypothesis which states that there is no significant effect of food security and poverty status on the output of cereal crop producers was rejected. This impliescertain factors exhibit both positive and negative effect on the output of cereal crops on food security and poverty status. The effect

of these factors therefore, implies that food security and poverty status are dynamic concepts that change as a result of increase or decrease in the utilization of available resources. The assertion agrees with Baulch and Hoddinott (2000) who observed that poverty status changes among households and has led to the increasing recognition that there is considerable flow in and out of the poverty pool implying that the poverty status of household is not static but dynamic. This means that, while some households live permanently in poverty, others only experience it temporary due to negative shocks resulting from sudden loss of welfare.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

Cereal production was male dominated and comprised mostly married people in the study area. Also most of the respondents in the study area were in their productive age. More so, most of the respondents in the study area had tertiary education. The mean annual income of the respondents in the study area was ₦ 481,034.8, this implies that cereal crop farmers under *fadama* III+ additional financing were proactive, resourceful and results oriented. Also, food security

revealed that 40.1% of respondents were secured while poverty status analysis revealed that 41.5% were non poor. The FGT measure of poverty further revealed that cereal producers' income must be raised by 59.7% for them to escape poverty line. Logit result on food security showed that the coefficient of income, number of extension contact had a positive determination on food security were as number of years in school, household size and number of years in cooperative negatively determined poverty status. Similarly, the multiple regression results indicated that age had negative effect on the output of cereal crop farmers. Furthermore, level of education, household size, farm size, farming experience and extension contact had positive effect on the output of cereal crop producers. Problem of road network, flooding, credit and storage facilities were some of the constrained faced by cereal farmers in the study area.

5.2 Recommendations

The following recommendations were made based on the empirical findings of the study

i. Good and accessible feeder roads should be constructed to ease movement of farm produce for famers, so as to reduce the cost of transportation from farm to nearest markets.

ii. Farmers should make their cooperative societies more viable, strong and proactive by integrating and sharing knowledge among themselves so that their resources could be harnessed and adequately utilized for higher output

iii. The third national *fadama* III+ additional financing development project should increase funding of its programme to achieve the food security objective of the states and nation as a whole.

iv. Non -governmental organizations, famer groups and cooperative societies should be more involved in the training and education of its members since they understand their weakness and were to compliment.

v. In view of the rampant flooding, experienced in the study area, appropriate erosion control measures should be put in place by funding agency and beneficiaries to reduce the waste of cereal grains during raining season.

vi. Storage facilities should be constructed by *fadama* III+ additional financing to reduce the large amount of wastes of cereal crops recorded yearly, this will go along in reducing poverty levels and sustaining food security status.

5.3 Contribution to Knowledge

Food security and poverty status are household indicators determining the well being of individual members of a community, region and country at large. The study demonstrated that, increase in the *fadama* III+ additional financing resulted in the increase of cereal production in the study area. Also, food security and poverty status of household changes among individual members of the household and has led to the increasing recognition that, there is a considerable flow in and out of the poverty pool implying that, poverty and food security are dynamic and not static. The loss of welfare of an individual in a family could result to poverty, natural disasters on environment and climate change could affect agricultural production. Likewise the introduction of an intervention like *fadama* III+ additional financing has lead to increase in food security.

REFERENCES

Abdullahi, W. (2017). A Preliminary study of rural women netrepreneurs: Characteristics and business success factors. *International Review of Social Sciences and Humanities,* 7(2), 172-181.

Adebayo, C. O. (2011). Evaluation of United Nations Development Program Microcredit Schemes on Food Security Status of Farm Households in Kaduna State. Unpublished Ph.D thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria, Nigeria.

Adebayo, K. & Okunneye, P.A. (2015). Economics of agricultural extension in: Agricultural Extension in inNigeria. (SF) 3, (1) 251.

Adejoh, S. D. (2009). Analysis of production efficiency and profitability of yam-based production systems In Ijumu LGA of Kogi State.'*Unpublished* M.Sc Thesis, Department of Ibadan, Ibadan.

Adejuwon, K. D. & Tijani, A. A. (2012). Poverty reduction and the attainment of the Millennium development goals in Nigeria: Problems and prospects. *International Journal of Research in Social Sciences* (IJRSS) ,2 (2) 53-74.

Adejuwon, S. A. (2004). Impact of climate variability and climate change on crop yield in Nigeria. Assessment of small holder farmers perception on climate change in Bauchi, Bauchi State

Adeola, S. S., Folorunso, S.T., Gama, E.N., Amodu, M.Y, & Owolabi, J.O. (2011). Productivity and Profitability Analysis of Cowpea Production in Kaduna State. *Advances in Applied Science Research,* 2(4): 72-78.

Adeolu, (2016). Transformation of Agricultural Education in Nigeria: Implication for Food Security. *Journal of Economics and Sustainable Development,* 7 (7), 1 – 7.

Adesope, O. M., Oguzor, N. S. & Ugwuja, V. C. (2012). Effect of socio-economic characteristics of farmers on their adoption of organic farming practices and crop production technologies. In: Peeyush Sharma (Ed.). Retrieved on 23rd July, 2019 from: http://www.intechopen.com/books/crop-productiontechnologies/effect-of-socio-economic-characteristics-offarmers-on-their-adoption-of-organic-farming-practices.

Adewuyi, S. A. (2014). Resource use productivity of rural farmers in Kwara State, Nigeria. *International Journal of Agricultural Sciences, Sciences, Environment and Technology* 1(1) 44 - 50.

Ajayi, J. O. (2014). Comparative economic study of mixed and sole cassava cropping sytems in Nigeria. Agris on-line papers in Economics and Informatics, 4 (4); 15 - 23

Ajayi, O. J., Sanusi O. Muhammed, Y. & Tsado, J. H. (2016). Livelihood diversification of rural households in Niger State, Nigeria. *Nigerian Journal of Agriculture Food and Environment,* 12 (2), 156 – 161.

Akinyosoye, V. O. (2000). Agricultural development projects (ADPs) and food crops production in Nigeria since 70s. Nigerian *journal of Agricultural Development Studies* 1(1), 11-15.

Akokundu, I. K. (1987). Weed science in the tropic. Principles and practice, pp. 1-3.

Alimi, F. L., Olugbenga, O. A. & Ayoola, O. O. (2016). Elements of rural economics: Access to agricultural information among rural women farmers in Abuja, Nigeria. *The Journal of Agricultural Sciences*, 12 (2), 63 – 75.

Alimi, T. & Ayanwale, A. B. (2006). Risk and risk management strategies in onion production in Kebbi State of Nigeria *Journal of Social science.*10 (1) 46 –48.

Amaza, P. Umeh, S., Chelsen, J.,& Adejobi, A. O (2014). Determinants and Measurement of food insecurity in Nigeria: some empirical policy guide. Contributed Poster Prepared For Presentation at the *International Association of Agricultural Economists Conference*, Gold Coast, Australia.

Anon (2019). Nigeria: Profile of Agricultural potential. *Agricultural Science Journal, Pakistan* 6 (7) 4-6

Arene, C. J. (2010). Agricultural economics a functional approach‖ prize publishers limited, Nuskka, Nigeria. *International Association of Policy Research Consortium, Africa.*

Awojobi, O. N. (2018). The socio-economic implications of boko haram insurgency in the North-East of Nigeria. *International Journal of Innovation and Scientific Research*, 11 (1), 144 – 150.

Babatunde, R. O., Omotesho, O.A., & Sholotan, O.S. (2017). Socio-economic characteristics of food security status of farming households in kwara state, north central Nigeria. *Pakistan Journal of Nutrition*, 6(1),49-58

Babatunde, R., & Oyatoye, E. (2016). Food security and marketing problems in Nigeria: the case of maize marketing in Kwara State, north central Nigeria. Retrieved on 11/01/2017 from http:/www.tropentag.de.org

Baumgart-Getz, A., Prokopy, L. S. & Floress, K. (2012). Why farmers adopt best management practice in the United States: A meta-analysis of the adoption literature. *Journal of environmental management*, 96 (1), 17 – 25.

Baulch & Hoddinott (2002). The impact of dairy development on protein and calorie intake of pre-school children. *Indian Journal of Medicine Science*, 4 (8), 61 – 64.

Bello, A. (2018). Fadama needs instrument for millennium development goal: an article written on Fadama II update in a bulletin of National Fadama Development Office, Abuja, Nigeria (PCU-NDDO). .3-7.

Bello, A. U. (2013). Herdsmen and Farmers Conflicts in North-Eastern Nigeria: Causes, Repercussions and Resolutions. *Academic Journal of Interdisciplinary Studies,* 2 (5), 129 – 139.

Benjamin & Joseph (2012). Living standard, living level and Economic well-being of older persons: similarity and differences in measuring these concepts. A holistic approach: National University Uganda. 65 (3), 19-24

Benjamin, T. A., Maganga, F. P. & Abdallah, J. M. (2009). The Kilosa killings: Political ecology of a Farmer - Herder conflict in Tanzania. *Development and Change*, 40 (3), 423 – 445.

Binamet, J. N., Tonye, J., Wandji, N., Nyambi, G., & Akoa, M. (2004). Factors affecting the technical efficiency among smallholder farmers in the slash and Burn agricultural zone of camerron. Food policy, 29: 531-545.

Bogale, S. (2012). Poverty and gender effects of smallholder organic contract farming in Uganda. Uganda strategy support program (USSP), USSP Working Paper No.8, June 2012. International Food Policy Research Institute (IFPRI) Washington, DC.

Chaudhuri, A. & Holbrook, M. B (2016). The Chain of effects from brand trust and brand affects to brand performance: the role of brand loyalty, *Journal of marketing*, 55(3), 661-668.

Ciotola, M., Diarra, C., Watson, A. K., & Kellet, S. G. (2013). Fusarium oxysporum isolate M12-4A co striga hermonthica in the field in West Africa, in proceedings of the IX International symposium on Biological control of weeds, South Africa, 19-26 january 2013, 109

CIA factbook, (2019). Farmers' Willingness to Adopt Conservation Agriculture: New Evidence from Lebanon. *Journal of environmental management*. 17 (9) 4 – 6

Clay, E. (2002). Food security: Concepts and measurement, Paper for FAO Expert Consultation on Trade and Food Security: Conceptualizing the linkages. 11-12. Rome.

De Cock, G. (2013). Is irrigation rehabilitation good for poor farmers? An impact evaluation of a non-experimental irrigation project in peru. *Journal of Agricultural Economics,* 62(2), 449-473.

De January (2010). Foster Greer & Thorbeecke poverty index: Expenditure and income approach. A food security analysis in central Asia. *Asian journal of Statistics and Economics* 42(9), 789-795

Deressa, T., Hassan, R. M., Alemu, T., Yesuf, M. & Ringler, C. (2008). Analysing the determinants of farmers' choice of adaptation methods and perceptions of climate change in the Nile Basin of Ethiopia. IFPRI Discussion Paper 00798.

Diao, X., Nwafor, M.,& Alpuerto, V. (2019). Options for Agricultural growth for poverty reduction in Nigeria. Nigeria Strategy Support Programme (NSSP) Background Paper 2, International Food Policy Research Institute, Washington D.C.

Duffuor, K. (2011). Budget statement and economic policy of the government of Ghana. P.49. Ghana.

Ekong, E. W. (2005). Group and non-group women farmers' access to agricultural production, responses in Akwaibom State, Nigeria. *Nigeria Journal of Rural Sociology,* 4(1), *85-90.*

Esiobu, N. S. and Onubuogu G. C. (2014). Socio-economic Analysis of Frozen Fish Marketing in Owerri Municipal Council Area, Imo State, Nigeria: An Econometric Model Approach; Scholarly Journal of Agricultural Science 4(8), 449-459

Enete, J. I. (2018). Transformation of Agricultural Education in Nigeria: Implication for Food Security. *Journal of Economics and Sustainable Development,* 7 (7), 1 – 7.

Ezeh, C. I. (2007). Poverty profiles and determinants of expenditures of rural women households in Abia State, Nigeria. *The Nigerian Journal of Development Studies.*6 (1), 187 – 204.

Falanta, E. M. & Bengasi, K. M. K (2018). Drivers and consequences of recurrent conflicts between farmers and pastoralists in Kilosa and Mvomero Districts, Tanzania. *Journal of Sustainable Development;* 11 (4); 20-24

FAO, (2005). The Gender dimension in rural cooperatives. From a paper commissioned by FAO for the centennial meeting of the International cooperative alliance, Manchester, UK, September, 2005 Retrieved 2, June,2012 from http://w.coop/idc/2005/2005-fao-en.pdf>

FAO, (2010). Cooperatives: A pathway to women's empowerment in rural area; Message from the Food and Agriculture Organization of the United Nations on the occasion of 16th International Day of Cooperatives Rome, Italy Retrieved 2,June 2012 from http://w.coop/idc/2010/2010-faoen.

FAO, (2012). Assessment of the world food security situation: committee on world food security, 23–26 may, 2005. FAO, Rome Italy.

FAO, (2013). The state of food insecurity in the World. The multiple dimensions of food security, Fao, Rome, Italy.

FAO, (2013). The state of food insecurity in the world.The 2013 edition. Available from www.fao.org/docrep/016/13027e00.htm

FAO, (2016). The state of food insecurity in the World, Food and Agriculture Organization of the United Nations. Rome.

FAO, (2013). Perspective study on Agriculture development in the Sahellian Countries Vol. 3

FAO,(2014). Food insecurity indicators. Retrieved from http://www.fao.org/economic/ess/essfs/fsdata/en/#.VEuIHPnF951

Farooq, S. & Azam, F. (2002). Food security in the new millennium-11.the role of Agriculture Biotechnology. *Pakistan Journal of Biological Sciences,*5:1363-1370.

Fasoranti, M. M. (2006). A stochastic frontier analysis of effectiveness of cassava based cropping systems in ondo state, Nigeria. *Unpublished* Phd Thesis, Department of Agricultural Economics and Extension, FUTA, Akure.

Fiaz, S., Noor, M.A., Mobeen, N., (2016). Effects of irrigation water management on rural farming families of district Faisalabad, Punjab, Pakistan. J. Global Innovations Agric. Soc. Sci. 4 (1),23–28.

Food and Agriculture Organisation (FAO) and World Bank (2017). The state of food insecurity in the world 2016. Rome, Italy.

Foster, J. & Greer, J. (2010). Decomposable Poverty, Applied to Kenya. *Journal of Development Economics*, 52(2), 761 – 766.

Fouzai A., Smaoui, M., Frija, A. & Dhehibi, B. (2018). Adoption of conservation agriculture technologies by smallholder farmers in the Semi-Arid region of Tunisia: Resource constraints and partial adoption. *Journal of new sciences Sustainable Livestock Management*, 6 (1), 105 – 114.

Fufa, B. & Hassan R. M. (2006). Determinants of fertilizer use on maize in Eastern Ethiopia: A weighted endogenous sampling analysis of the extent and intensity of adoption. *Agrekon*, 45 (1) March 2006.

Gana, A. S., Maji,A. T.,Ukwungu, M. N.,Imolehin, E. D.& Ogunremi, L. (2000). Rice producing areas and potentials in Nigeria. Principles, prospects and practice. *Journal of Science and outlook*, New York press. USA.

Geta, E., Bogale, A., Kassa, B. & Elias, E. (2013). Determinants of farmers' decision on soil seeds production in Kwara State, Nigeria. *Journal of Food Security Studies*, Pensylvenia. 31 (8), 10-16

Greer, J & Thorbeecke, E. (1986). A Methodology of Measuring Poverty, Applied to Kenya. *Journal of Development Economic*s, 24 (2): 59 – 74.

Guo, B. (2013). Evaluation of Ethiopia's Food Security Program: Documenting Progress in the Implementation of the Productive Safety Nets Programme and the Household Asset Building Programme". Ethiopia Strategy Support Program II (ESSP II). International Food Policy ResearchInstitute. Institute of Development Studies, University of Sussesex.

Haile, H. K., Alemu, G. & Kudhlande, G. (2015). Causes of household food insecurity in Koredegaga peasant association, Oromiya zone, Ethiopia,Working paper, Department of Agricultural Economics, Faculty ofAgricultural Sciences, University of the Free States.

Hartwich, F.M., Monge, P. L., Ampuero, R.,& Soto, J.L. (2007). Knowledge management for agricultural innovation: Lessons from networking efforts in the Bolivian agricultural technology system. *Knowledge Management for Development Journal* 3(2), 21-37

Henoa, J. & Baanante, C. (2016). Agricultural production and soil nutrient mining in Africa implications for resource conservation and policy development. http://www.africa fertilizer sumit.org/on line-press Room/soil 20% nutrients 20% mining

Hoddinott, J. & Yohannes, Y. (2002) Dietery Diversity as a Food Security indicator. FCND discussion paper N0.136 IFPRI, Washington, D. C.

Hunt, P. Osmanis, S. & Nowak, M. (2004). Summary of the draft guidelines on human rights approach to poverty reduction strategieswww.uhuchrich/development/poverty.html.

IAPPS,(2012). New sorghum / millet and other grains. IAPPS News letter

Idachaba, F. S. (2006). Strategic and policies for food security and economic development in Nigeria. Lagos: CBN.

Idiong, I. C., Agom, D. I., Effiong, E. O. & Ohen, S. B. (2015). Analysis of technical and Economic efficiencies in rice production Systems in the Niger Delta Region of Nigeria. in sustaining Agricultural growth to meet national Economic Development Goal. Proceedings of the 23rd annual conference of the farm management association of Nigeria,FAMAN :105 – 107

Idrisa, Y. I., Gwary, M. M. & Shehu, H. (2008). Analysis of Food Security Status among Farming Households in Jere Local Government Area of Borno State, Nigeria. *Journal of Tropical Agriculture, Food, Environment and Extension,* 7(3), 199-205.

Idumah, F. O. (2006). Productivity differentials among food crop farmers in the Niger Delta.*Unpublished* P.hd Thesis, Department of Agricultural Economics, University of Ibadan, Ibadan. IFAD 2009. Country Program Evaluation: Federal Republic of Nigeria. Report No. 1959–N.

IFPRI, (2007). Strengthening communities, reducing poverty, Nigeria's fadama project, retrieved on April 20,2015 from http//www.ifpri.Org/pubs/newsletter/IFPRIFORUM

Igbaese, F. I & Okojie-Okoedo,D (2010). Food and hunger every where: a Nigerian paradox of poverty. *International Review of Business Research Papers*.6.(4),90 – 100.

Ike, P. C. (2012). An analysis of the impact of Fadama III project on poverty alleviation in Delta State, Nigeria. *Asian Journal of Agricultural Sciences*, 4 (2), 158-164.

Imo, C. K. (2017). The demographıc implıcatıons of nomadıc herdsmen and farmers clashes in Nıgerıa. *International Journal of Development and Management Review (INJODEMAR)*, 12(1), 45-58.

Iwala O. (2014). Fertility management options for maize production in Southern Ethiopia. *American Journal of Experimental Agriculture,* 3(1), 226-239.

International Food Policy Research Institute (2010). From the ground up. impact of pro-poor community-driven development project in Nigeria: 40 – 51.

Jebran (2016). Locally derived knowledge of soil fertility and its emerging role in integrated natural resource management. In: Van Noodwijk, M., Cadisch, G. & Ong, C. (eds.) *Below ground interactions in tropical agro-ecosystems: Concepts and models with multiple plant components.* United Kingdom: CAB International, Wallingford press, 17 – 39.

Joseph O. A. (2015). Examining the boko haram insurgency in northern Nigeria and the quest for a permanent resolution of the crisis: Published in UK by European Centre for Research Training and Development. *Global Journal of Arts, Humanities and Social Sciences.*

Kamau, M., Smale, M. & Mutua, M. (2014). Farmer demand for soil fertility management practices in Kenya's grain basket. *Journal of Food Security,* 6(6), 793-806

Kankwanda, M. L. Greogoire, H. Legros & Ouedraogo, H. (2015). Poverty Eradication: Where Stands Africa? London: Economical.

Kansiime, M. K. & Wambugu, S. K. (2014). Determinants of farmers' decisions to adopt adaptation technologies in Eastern Uganda. *Journal of Economics and Sustainable Development,* 5(3), 189-199.

Kassie, M., Jaleta, M., Shiferaw, B., Mmbando, F. & Mekuria, M. (2013). Adoption of inter-related sustainable agricultural practices in smallholder systems: Evidence from rural Tanzania. *Technological Forecasting and Social Change,* 80(3), 525-540.

Kassie, M., Teklewold, H., Jaleta, M., Marenya, P., & Erenstein, O. (2015). Understanding the adoption of a portfolio of sustainable intensification practices in eastern and southern Africa.Land Use Policy, 42 (2015), 400–411

Kehinde, I. A. (2010). Fungi toxicity of essential oils of some tropical plants to fungal pathogens of melons (Citrulus lanatus) Thunb Mans) *Nigerian Journal of Mycology*

Kolawale, O. & Ojo, S. O. (2013). Economic efficiency of small scale food crop production in Nigeria.National Cereals Research Institute Bedeggi (NCRI) 2008. Metrological Station report 14(2), 123-130

Long, J. S (2013). Regression Models for Categorical and Limited Dependent Variables: Advanced Quantitative techniques in the Social Sciences Series:SAGE,Thousand Oaks, CA: Sage.

Machethe, C. L. (2016). Agriculture and poverty in South Africa: Can Agriculture reduce poverty? Paper presented at the conference, overcoming underdevelopment, October 28 – 29, 2004, Pretoria, South Africa: 65 – 66.

Mango (2014). Farmers' knowledge, attitude and practice toward organic vegetables cultivation in Northeast Thailand. *Kasetsart Journal of Social Science,* 35, 158 – 166

Maria, S. (2005). Strategic Communication for Rural Development In collaboration with the Communication for Sustainable Development in Operations Unit Development Communication Division External Affairs Vice-Presidency the World Bank.

Mohammed, M. I., Baba, K. M., & Tanko, L. (2014). Impact of second national fadama development project on income and wealth of crop farmers in Niger State, Nigeria. *International Journal of Agric. Science,* 4(4), 224-234.

Muddassir, M., Jalip, M. W., Noor, M. A., Zia, M. A., Aldosri, F. O., Zuhaibe, Au. H., Fiaz, S., Mubushar, M. & Zafar, M. M. (2016). Farmers' perception of factors hampering maize yielding rainfed region of pinddadankhan Pakistan. J. Agr. Extensio 20(2),117 .http://dx.doi.org/10.4314/jae.v20i2.1.

Muhammad, S., Muhammad, H. S., Muhammad, F. S., Niaz, A. Q., & Safia, M. (2017). The importance of cereals (Poaceae: Gramineae) nutrition in human health: Areview. *Journal of Cereals and Oil seeds* 4(3), 32-35

Mushunge, A., Muchaonyerwa, P., Mandikiana, B. W. & Taruvinga, A. (2011). Smallholder farmers' perceptions on Bt maize and their relative influence towards its adoption: The

case of Mqanduli communal area, South Africa. *African Journal of Agricultural research.* 6(27), 5918-5923.

Mustapha (2015). Impact of Survival Farming Intervention Programme (SFIP) in selected LGAs of Kogi State, Nigeria. An MSc Thesis, Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.

Mustapha, S. B., Makinta, A. A., Zongoma, B. A. & Iwan, A. S. (2012). The socio-economic factors affecting adoption of soya bean production technology in Takum Local Government Area of Taraba State Nigeria: *Asian Journal of Agricultural and Rural Development*, 2(2) 271-276.

Mwasha, D. I. (2016). An evaluation of farmers' perceptions of and adaptation to the effects of climate change in kenya. *International Journal of Food and Agricultural Economics*, 1(1), 75 – 96.

Napoli, M. (2011). Towards a food insecurity multidimensional index (FIMI). Master Thesis, 2011.http://typo3.fao.org/fileadmin/templates/ERP/uni/FIMI.pdf.Accessed 22 Nov 2019.

National Bureau of Statistics (NBS) (2012). Nigeria poverty assessment report. National Bureau of Statistics, Abuja: 18 – 20.

National Bureau of Statistics (NBS) (2015). Nigeria Poverty Assessment report.National Bureau of Statistics, Abuja: 15 – 20.

National Population Commision (NPC) (2006) Estimates population figures. National Bureau of Statistics, Abuja.

NEARLS (2014). Prospects and problems of the 2014 cropping season. A report of a study conducted by the National Agricultural Extension Research and Liaison Services (NEARLS) and Agricultural planning Monitoring and Evaluation Unit (APMEU), 2-11 Jan. 2014. (NEARLS), Ahmadu Bello University, Zaria pp. 62.

Nehring, S. (2013). An evaluation of farmers' perceptions of and adaptation to the effects of climate change in kenya. *International Journal of Food and Agricultural Economics*, 1(1), 75 – 96.

Nehring, S. (2016). Assessment of invasive tree species in nature conservation and forestry – constructions and coherence: European forest institute. Opportunities and challenges pp. 148-156

Nelson, G. C. (2015). Climate change Impact on Agriculture and Cost of Adaptation. IFPRI, Washington D.C.

Nigerian Bureau of Statistics (NBS) (2012). Annual Abstract of Statistics, 2005: 25.

Niger State Fadama Coordination Office (NSFCO) (2019). Prospect of Niger State Agricultural Fadama Development Programme, pp 18-20.

Nwaiwu, J. C. (2015) Socio - economic factors influencing arable crop farmers Adoption of Environmental Conservation Measures in South Eastern Nigeria. *International Journal of Research in Agriculture and Forestry*, 2(3) 20-25

Nyikahadzoi, A. (2012). Returns to treatment in the formal health care sector:Evidence from Tanzania. *American Economic Journal: Economic Policy 7* (3), 29–57.

Obasi, O. O. Nwachukwu, I. & Onuekwusi, G. C. (2005). Women in Rural Development: The Nigerian Experience. Agricultural Extension and Rural Sociology. Snaap Publishers, Enugu.

Ogungbile, A. O. & Olukosi, J. O. (2012). An over view of the problem of the resource poor farmers in Nigerian agriculture 6(3) 21-34. In: N.U.A.

Ogunmefun, S. O. & Achike, A. I. (2015). Socio-economic characteristics of rural farmers and problems associated with the use of informal insurance measures in Odogbolu Local Government Area, Ogun State, Nigeria. *Rural Journal of Agricultural Science*, 2(38): 1-14

Ogunwole, J. O. & Owonubi,J. J. (2015). Climate variation and potential production of irrigated agriculture in Nigeria 2(5), 285-290.

Olabande, M. & Riely, F. (2017). Food security indicators and framework for use in the monitoring and evaluation of food aid programmes, Washington, D.C. 2014; 2017.

Olagunju, F. I., Oke, J. T. O., Babatunde, R.O.,& Ajiboye, A. (2012). Determinants of food insecurity in Ogbomoso metropolis of Oyo State, Nigeria, PAT June, 2012; 8 (1): 111 - 124

Olaolu, M. O. Akinagbe, O.M., & Agba, T. (2020). Impact of national fadama development project phase (II) on poverty and food security among rice farming beneficiaries in Kogi State, Nigeria: 17 – 24.

Olaoye, O. (2010). Developing drought tolerant varieties for the savannah agro-ecologies of Nigeria in 25thyear commemorative publication of Genetic Society of Nigeria (2010) pp. 173-182.

Omonona, B. T. (2014). Quantitative analysis of rural poverty in Nigeria.Nigeria strategy support programme (NSSP) background paper 9, International Food Policy Research Institute, Washington D.C.

Omonona, B. T., & Agoi, G. A. (2007). An analysis of food security situation among Nigerian Urban Households: Evidence from Lagos State, Nigerian. *Journal of Central Agriculture*,8(3)397406

Omonona, B. T., Akinterinwa, A.T., & Awoyinka, Y. A. (2008). Credit constraint and output supply of cowan farmers in Oyo State, Nigeria. *European Journal of Social Sciences*, 6(3): 382 – 390.

Oni, O.A.,Salman, K. K.,& Idowu, B. O. (2016). Social capital dimension and food security of farming households in Ogun State, Nigeria. *Journal of American Science,* 7(8):776 – 783.

Onubuogu, (2014). Farmers' group growth trend in Delta State, Nigeria. *Global Journal of Science Frontier Research-Agriculture and Biology,* 12 (3), 61 – 66.

Onwueme, T. D. & Sinha, (2012). Farmers' group growth trend in Delta State, Nigeria. *Global Journal of Science Frontier Research-Agriculture and Biology,* 12 (3), 61 – 66.

Oredipe, A. A. (2015). Effects of membership of cooperative organizations and determinants on farmer – member's income in rural area, Anambra State, Nigeria. *International Journal of Scientific and Technology Research,* 4 (8), 28 – 35.

Okike, (2014). The socio-economic characteristics of rural farmers and their net income in Ojo and Badagry Local Government Areas of Lagos State, Nigeria. Article *in* acta universitatis agriculturae et silviculturae mendelianae brunensis, January 2017. Doi:10.11118/actaun201765062037

Oriola, E. O. (2012). Irrigation agriculture. An option for achieving the Millennium Development Goals (MDGs) in Nigeria. *Journal of Geography and regional planning*, 2(7), 176-181.

Oseni, S. O. (2001). Econometric analysis of productivity of tuber crops in nigeria (1966– 1998).*Unpublished* Msc Thesis, Department of Agricultural Economics, University of Ibadan, Ibadan.

Owusu, S. (2011). Effect of access to credit on agricultural productivity: evidence from cassava farmers inthe Afgya-Kwabre District of Ghana. *International Journal of Innovative Research in Social Sciences and Strategic Management Techniques,* 4(2): 55–67.

Perez-morales (1990). Patterns and Determinants of Livelihood Diversification among Farm Households in Odeda Local Government Area, Ogun State, Nigeria. Paper Presented at the Nigerian Association of Agricultural Economist Conference held at Obafemi Awolowo University, Ile-Ife from 25 – 27, September. Theme: Agriculture in the National Transformation Agenda: The Policy Mix

Prokopy, L., Floress, K., Klotthor-Weinkauf, D., & Baumgart-Getz, A. (2008). Determinants of agricultural best management practice adoption: Evidence from the literature. *Journal of Soil and Water Conservation, 63*(5), 300-311.

Pulido, J., & Bocco, G. (2014). Local perception of land degradation in developing countries: a simplified analytical framework of driving forces, processes, indicators and coping strategies. *Living Review of Landscape Research, 8*.

Raphael, G. (2017). Agricultural Policy-Making in Sub Saharan Africa: Kenya Past Policies. Nairobi: Tegemeo Institute of Agricultural Policy & Development.

Rogers, E. M. (1995). Diffusion of innovations (4th Edition).New York, the Free Press. 12-40

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). New York: Free Press.

Sanginga, N. & Woomer, P. L. (2009). Integrated soil fertility management in Africa: principles, practices and developmental process. Tropical soil biology and fertility Institute of the International Centre for Tropical Agriculture, (IITA) Nairobi, 263

Sanusi, S. (2006). Study of Perspective of development of organic farming. *Planning and Agricultural Economics Research Institute,* 51, 24 – 35

Sarah, (2013). Measurement of technical efficiency and its determinants in sampea-11 variety of cowpea production in Niger State, Nigeria. *International Research Journal of Agricultural Science and Soil Science* (ISSN: 2251-0044) Vol. 5(4) pp. 112-119, July, 2015

Sasidharan, A. (2015). Adoption of organic farming technologies in banana and vegetable crops in Kasaragod District. *Journal of Science in Agriculture*,5(*20*), 67 – 74

Sauerborn, J. (2014). The economic importance of the phytoparasites orobanche and striga. proceeding of the 5th International symposium on parasitic weeds. pp. 137-143 GMMYT Nairobi, Kenya.

Salawu, (2007). Determinants of adoption of improved Haricot Bean production package in Alaba special Woreda, Southern Ethiopia. *Journal of Agricultural Extension,* 5 (10), 1169 – 1181.

Shehu, R. (2010). A study on knowledge and adoption of plant protection measures in coconut cultivation by farmers of Chitraduga District. *Indian Journal of Extension Education,* 33 (44), 64 – 132.

Shehu, A. U. & Okike, C. O. (2014). Farmers' group growth trend in Delta State, Nigeria. *Global Journal of Science Frontier Research-Agriculture and Biology*, 12 (3), 61 – 66.

Solomon, O. (2008). Small scale oil palm farmers' perception of organic agriculture in Imo State, Nigeria.*Journal of Environmental Extension*, 7(1), 67-71.

Tchale, H. & Sauer, J. (2017). The efficiency of maize farming in Malawi. A boots trapped translong frontier. Cashier d' economie et sociologie rurales 82-83:33-56.

Teshome (2018). Effects of membership of cooperative organizations and determinants on farmer – member's income in rural area, Anambra State, Nigeria. *International Journal of Scientific and Technology Research,* 4 (8), 28 – 35.

Teklewold, (2013). A study on knowledge and adoption of plant protection measures in coconut cultivation by farmers of Chitraduga District. *Indian Journal of Extension Education,* 33 (44), 64 – 132.

Teshome, A., Graaff, J., Ritsema, C. & Kassie, M. (2008). Farmers' Perceptions about the Influence of Land Quality, Land Fragmentation and tenure Systems on Sustainable Land Management in the North Western Ethiopian Highlands. *Land Degradation and Development*.

Tijani, A. A, Alimi, T & Adesiyan, A. T (2006). Profit efficiency among Nigerian poultry egg farmers: A case study of Aiyedoto farm settlement, Nigerian Research *journal of Agricultural Biological Sciences,* 2(6):256-261

Tuedogheye, J. G., Jirgi, A. J., Adebayo, C. O., & Ibrahim, F. D (2015). Technical efficiency of Broiler production in Edo state, Nigeria. *Journal of Agriculture and Agricultural Technology*, 6(1): 91-96.

Ugochukwu, A. & Peter, W. B. (2018). Technology Adoption by Agricultural Producers: A Review of the Literature. doi: 10.1007/978-3-319-67958-7_17

Ugwoke, F. O., Adesope, O. M. & Ibe, F. C. (2005). Youth participation in farming activities in rural area of Imo State, Nigeria: Implications for Extension. *Journal of Agricultural Extension,* 8:136-142

Umar, I. S., Ndanitsa, M. A., Mohammed, I. & Tyabo, I. S. (2015). Capacity building needs of farmers for sustainable poverty allevaition in Niger State, Nigeria. *Journal of Emerging Trends Economics and Management*, 6 (8), 201-206.

Umar, I. S., Olaleye, R. S. & Ndanitsa, M. A., (2013). Capacity building needs of farmers for safe Agro-chemical use in Niger State, Nigeria. *Journal of Agricultural Extension,* 13 (1), 221-225

United Nations Development Programme (UNDP), (2013). Sustainable livelihoods; Concept, Principles and Approaches to Indicator Development-Draft. Available online: www.Undp.org/sl/docs. (Accessed on February 19th, 2016.

United Nations, (2012). Technology Adoption by Agricultural Producers: A Review of the Literature. doi: 10.1007/978-3-319-67958-7_17

United Nations Population Fund, (UNPF) (2016). Population Projection in Nigeria.

United States Agency for International Development (USAID) (2011). Promoting Food Security in Sub-Saharan Africa. *The Journal Outlook on Agriculture* vol. 27(5),302-307

USDA, (2008). Investment Climate Statement. Abuja: US Department of State, p.2. Available at: https://www.state.gov/documents/organization/229183.pdf

Urgessa (2015). Adoption of recommended rice production practices among women rice farmers in Nassarawa State, Nigeria. *Journal of Agricultural Extension*, 20 (1), 107 – 120.

Usman, S. (2018). Multi-dimensional poverty index of rice farming households in northern Nigeria: estimation and policy implications.Nigerian *Journal of Agricultural Extension* 19(1), 401-409s varietal development for rainfed lowland ecology of Nigeria, change and opportunities paper presented at the first ROCARIZ meeting held in Mbe Coted' Ivoire.

World Bank (2014). Big results now in education programme: Programme appraisal document (report no.84545-tz).

World Bank (2016). World development indicators. Fadama III+ approach to poverty reduction in Nigeria. www://worldbank.org

World Bank, (2013). Fadama III Rural Agriculture Project Fast Becoming a Household Name in Nigeria. www://worldbank.org

World Bank, (2014). World Development Report 2013/2014. Attacking poverty,New York, N.Y.,Oxford University Press (www.worldbank.org/poverty/wdrpoverty/report/)

World Bank, (2017). Nigeria poverty in the Most of Plant, the Challenge of Growth with Inclusion. *World Bank Poverty Assessment*, Washington, D.C. World Bank: 26.

www.foodandenvironment.com/2013/01/basic-concepts-of-food-security.html?m=1

Yengoh, G. T., Armah, F. A., & Svensson, M. G. (2010). Technology adoption in small-scale agriculture.*Science, Technology and Innovation Studies,* 5(2), 111–131.

Yunana,M. B., Abubakar, A. S., & Francis, O. A. (2013). Analysis ofImpact of National Fadama Development Projects on Beneficiaries Income and Wealth in FCT, Nigeria. *Journal of Economics and Sustainable Development,* 4 (17): 11-23.

Yusuf, B. I., Baba, K. M., Mohammed, I. & Dogondaji, S. D (2009). Determinants of Rice Production: A Guide for Food Security Policy in Nigeria, In Sustaining AgriculturalGrowthtoMeetNationalEconomic DevelopmentGoal.*Proceedings of the 23rd Annual conferenceoftheFarmManagementAssociation of Nigeria, FAMAN*.

Yusuf, Oseni Williams Nwachukwu and Abubakar Usman Z. (2015). Measurement of technical efficiency and its determinants in sampea-11 variety of cowpea production in Niger State, Nigeria. *International Research Journal of Agricultural Science and Soil Science* (ISSN: 2251-0044) 5(4) pp. 112-119

APPENDIX 1

DEPARTMENT OF AGRICULTURAL EXTENSION AND RURAL DEVELOPMENT
SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

RESEARCH QUESTIONNAIRE

Dear Sir/Madam,

I am an MTECH student of the above named University and is currently conducting a research on "Evaluation of Food Security and Poverty Status of Cereal crops farmers under*Fadama* III + Additional Financing in Niger State, Nigeria." You are please expected to answer the questions based on facts and personal experience. All information provided will be kept absolutely confidential. Thanks for your co-operation.

TSAVHEMBA, Samuel Terhide
08065959395, 09094988821

Name:_____
Village:_____
Local Government Area:_____
Date of interview:_____2019

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

1. Sex: (i) Male [ ] (ii) Female [ ]
2. Age of respondents(years)…….
3. Marital status: (i) Married [ ] (ii) Single [ ]
4. If single, tick the one that best describes your condition

(i) Divorced [] (ii) Widowed [] (iii) Separated [ ] (iv) Single parent[ ](v) Others (specify)….

5. How many of your household members fall in the following age group?

Age group (in years)	Number of males	Number of females
0–4		
5–14		
15–64		
65 and above		

6. What is your highest educational qualification?

(i) Primary [ ] (ii) SSCE/GCE [ ] (iii) NCE/OND/Nursing [ ] (iv) HND [ ] (v) Degree [ ]
(vi) Master's Degree[ ] (vii) Non-formal [ ]

7. How long have you been farming? _____years
8. Did you have contact with extension agent last growing season? (a) Yes [ ] (b) No [ ]
9. How many time did you have contact with extension agent last cropping season?_____
10. Do you belong to any cooperative society? (a) Yes [ ] (b) No [ ]
11. If yes, how many yearshave you been a member of cooperative society?_____
12. If yes, how many cooperative society did you belong to?_____

13. What is the distance between your house to the farm?_____km
14. What is your primary occupation? (a) Farming [ ] (b) Non-farming [ ]
15. Kindly indicate your secondary occupation.
(i) Farming [ ] (ii) Trading [ ] (iii) Government job [ ] (iv) Private job [ ] (v) Craftsmanship [ ]
(vi) Artisans [ ] (vii) Others (specify)_____
16. Did you have access to credit last cropping season? (i) Yes [ ] (ii) No [ ]
17. If yes,kindly indicate the source of credit and the amount received in Naira.
i. National Fadama Development Project [ ] ₦_____
ii. Bank of Agriculture [ ] ₦_____
iii. Commercial Banks [ ] ₦_____
iv. Cooperatives [ ] ₦_____
v. Friend/Relatives [ ] ₦_____
vi. Others (specify)_____ [ ] ₦_____
24. What other agricultural enterprises are you into apart from cereal crops?
(i) Staple food crop [ ] (ii) Livestock [ ] (iii) Cash crops [ ] (iv) Tree crops [ ]
(v) Others (specify)_____
19. What was your estimated income from cereal crops last production?₦_____
20. Did you participated in off-farm activities? (i) Yes [ ] (ii) No [ ]
21. If yes, what type of off-farm activities did you engage in last cropping season?
(i) _____
(ii)_____
(iii)_____
(iv)_____
22. How much did you earn from the following sources of income?

S/No	Income Sources	Amount (₦)
1	Self-employment (trading, tailoring, carpentry, crafts, bricklaying, blacksmithing, barber's work, shoe cobbling, repairing of bicycles and motorcycles, etc.)	
2	Government employment (salary)	
3	Private employment (salary)	
4	Money earned from interest on capital lent out and rent on building or dividend on shares, etc.	
5	Remittances (money sent by children and relatives)	

23. Kindly indicate which of the following household assets you owned.

Item	No.	Price per unit	Amount in Naira (₦)	Year of Purchase
House				
Bicycle				
Motorcycle				
Motor vehicle				
Radio/TV Set				
Oxen				
Others (specify)___				

24. Kindly indicate how many livestock you own and also provide other related information.

Livestock	No. of livestock	No. of livestock	No. of livestock	Price per unit

	owned	sold	consumed	livestock (₦)
Cattle				
Sheep				
Goats				
Pigs				
Chickens				
Ducks				
Guinea fowls				
Others (specify)_____				

SECTION B: INFORMATION ON FOOD SECURITY AND POVERTY STATUS

25. Kindly provide information on the following food crops purchased or produced.

	Item purchased last season for household consumption		Amount produced last cropping season (quantity/unit)	Amount consumed from last season's production (quantity/units)	Amount consumed from last season's production (quantity/units)	Value of prepared foods purchased outside household last week (₦)
	Quantity	Price perunit				
Maize						
Grain						
Flour						
Sorghum						
Grain						
Flour						
Millet						
Grain						
Flour						
Rice						
Cassava						
Tubers						
Gari						
Cassava chips						
Yam						
Tubers						
Yam flour						
Cocoyam						
Corms						
Groundnut						
Shelled						
Unshelled						
Soybean						
Grain						
Flour						
Cowpea						
Okra						
Tomato						

Onion						
Pepper						
Egg plant						
Carrot						
Pumpkin						
Green leaves						
Guava						
Citrus						
Mango						
Others (specify)						

26. How often did your household consume the following food items last cropping season?

Item	Daily	Twice per week	Weekly	Bi-weekly	Monthly
Millet					
Sorghum					
Maize					
Rice					
Groundnut					
Beans					
Bread					
Egg					
Meat					
Fish					
Groundnut Oil					
Butter					
Tea/Beverages					
Fruits					
Vegetables					
Others (Specify)___					

27. Kindly indicate your expenditure on the following household consumption items.

Household Consumption Items	Yes	No	Amount spent (₦)
Salt/Potash/Maggi			
Groundnut oil			
Palm oil			
Fish (fresh/dried/smoked)			
Meat (beef/mutton, etc.)			
Sugar			
Bread			
Cigarettes, tobacco, kola nuts			
Drinks (beer, local sweet drinks, minerals)			
Shoes (leather, plastic, slippers)			
Clothing (fabric and clothing)			
Purchase of motor vehicles			

Purchase of motor cycles			
Purchase of bicycles			-
Repairs of vehicles/bicycles			
Home repairs (painting, roofs, plastering)			
Kitchen utensils (pots, cups, cutlery, plates, spoons,			
Furniture (beds, tables, chairs, cartons, etc.)			
Petrol for vehicles			
Kerosene			
Detergents (soaps)			
Pomades			
Toothpaste			
Remittances/Gifts/Donations			
Festivals			
Funerals			
Agro-services (tractor hiring, spraying, threshing, etc.)			
Electricity bills			
Transportation (money spent on transport)			
Agrochemicals (herbicides, pesticides, etc.)			
Fertilizer			
Debts			
Others (specify)_____			

28. Kindly indicate the ownership type of the land you cultivate.
(a) Individual [ ] (b) Family [ ] (c) Community [ ] (d) Rented [ ] (f) Others (specify)_____
29. Kindly give a rough estimate of the total size of land cultivated. _____(ha)
30. State the labour usage in production last cropping season in the following farm operations.

Operation	Family labour				Hired labour			
	No. of Adults	No. of Days	No. of Children	No. of Days	No. of Adults	No. of Days	No. of Children	No. of Days
Land clearing								
Planting								
Weeding								
Fertilizing								
Spraying								
Harvesting								
Threshing								
Transportation								
Others (specify)_								

31. Do you use modern farm inputs on your farm? (a) Yes [ ] (b) No [ ]
32. If yes, which of the following farm inputs did you use in your farm last cropping season?
(a) Improved seeds [ ] (b) Fertilizer [ ] (c) Agro-chemicals [ ] (d) Veterinary drugs [ ]
(e) Livestock concentrates [ ] (f) Others (specify)_____

33. What is the distance between your village and the source of inputs?_____ km.

SECTION C: CONSTRAINTSASSOCIATED WITH CEREAL PRODUCTION

34. Kindly indicate the constraints you faced in cereal crops production.

Constraints	Very Serious	Serious	Not serious
Flooding			
Problem of weed			
Inadequate irrigation facilities			
Inadequate supply of inputs			
Inadequate extension advisory services			
Inadequate improved seed for planting			
Poor fertility of the soil			
High cost of hired labour			
Inadequate information on cereal crops			
Lack of storage facility			
Laborious nature of production			
Incidence of pest and diseases			
Lack of credit facilities			
Inadequate farmland			
Problem of road networks linking markets			
Others (specify)_____			

APPENDIX II

name: <unnamed>

log: C:\Users\Olajide\Desktop\Samuel **Objective One** Socioeconomic Characteristics.log

log type: text
opened on: 16 Nov 2019, 12:23:29
tab agerange301314024150351604605
Age range, |
<30=1, |

31-40=2, |

41-50=3, |

51-60=4, |

>60=5 | Freq. Percent Cum.
---+---
1 | 49 23.67 23.67

2	75	36.23	59.90
3	53	25.60	85.51
4	23	11.11	96.62
5	7	3.38	100.00
Total	207	100.00	

tab yearspentinschoolrange1617122123

Year spent in school range, 1-6=1, 7-12=2, >12=3, None=4

	Freq.	Percent	Cum.
1	12	5.83	5.83
2	65	31.55	37.38
3	114	55.34	92.72
4	15	7.28	100.00
Total	206	100.00	

tab householdsizerange15161021115316

Household size range, 1-5=1, 6-10=2, 11-15=3, 16-20=4, >20=5

	Freq.	Percent	Cum.
1	40	19.32	19.32
2	48	23.19	42.51
3	36	17.39	59.90
4	43	20.77	80.68
5	40	19.32	100.00
Total	207	100.00	

tab farmingexperiencerange1101112022

Farming experience range, 1-10=1,

11-20=2, |
21-30=3, |
31-40=4,>40 |
=5 | Freq. Percent Cum.
------------+-----------------------------------
1 | 61 29.47 29.47
2 | 54 26.09 55.56
3 | 63 30.43 85.99
4 | 21 10.14 96.14
5 | 8 3.86 100.00
------------+-----------------------------------
Total | 207 100.00tab maritalstatusmarried1single2 **Marital |**
status, |
Married=1, |
Single=2 | Freq. Percent Cum.
------------+-----------------------------------
1 | 189 91.30 91.30
2 | 18 8.70 100.00
------------+-----------------------------------
Total | 207 100.00tab gendermale1female0 **Gender, |**
Male=1, |
Female=2 | Freq. Percent Cum.
------------+-----------------------------------
1 | 198 95.65 97.58
2 | 9 4.35 100.00
------------+-----------------------------------
Total | 207 100.00tab farmsizerange1110120220130330140 **Farm size |**

range, < |
1=1, |
1.01-2.0=2, |
2,01-3.0=3, |
3.01-4.0=4, |
>4=5 | Freq. Percent Cum.
------------+-----------------------------------
1 | 22 10.63 10.63
2 | 39 18.84 29.47
3 | 37 17.87 47.34
4 | 37 17.87 65.22
5 | 72 34.78 100.00
------------+-----------------------------------

Total | 207 100.00tab ownership type of the land you cultivated

Ownership |
type of the |
land you |
cultivate, |
Individual= |
1, |
family=2, |
community=3 |
, r | Freq. Percent Cum.

---

1 | 28 13.53 13.53
2 | 164 79.23 92.75
3 | 7 3.38 96.14
4 | 8 3.86 100.00

Total | 207 100.00tab income range10000110100020000022

Income |
range, |
<100000=1, |
101000-2000 |
00=2, |
201000-3000 |
00=3, |
301000-4000 |
00=4,>4000 | Freq. Percent Cum.

---

1 | 51 24.64 24.64
2 | 45 21.74 46.38
3 | 27 13.04 59.42
4 | 11 5.31 64.73
5 | 72 34.78 99.52

7 | 1 0.48 100.00

Total | 207 100.00tab contact with extension agentes1no0

Contact |
with |
extension |
agent, |

Yes=1, No=0 | Freq. Percent Cum.

---

0 | 81 39.13 39.13

1 | 126 60.87 100.00

Total | 207 100.00tab noofvisitrange12134243none4

No of visit |

range, |

1-2=1, |

3-4=2, |

>4=3, |

None=4 | Freq. Percent Cum.

---

1 | 50 24.15 24.15

2 | 35 16.91 41.06

3 | 41 19.81 60.87

4 | 81 39.13 100.00

Total | 207 100.00tab what is your primary occupation farmi

What is |

your |

primary |

occupation, |

farming=1, |

non |

farming=2 | Freq. Percent Cum.

---

1 | 192 92.75 92.75

2 | 14 6.76 99.52

3 | 1 0.48 100.00

Total | 207 100.00tab highest level of education primary1s

Highest |

level of |

education |

Primary=1, |

Secondary=2 |

,Tertiary=3 |

, Adult |

education=4 |

, | Freq. Percent Cum.

------------+-----------------------------------

1 | 18 8.70 8.70

2 | 63 30.43 39.13

3 | 111 53.62 92.75

4 | 3 1.45 94.20

5 | 12 5.80 100.00

------------+-----------------------------------

Total | 207 100.00tab do you use modern farm inputs on your farm

Do you use |

modern farm |

inputs on |

your farm? |

Yes=1, No=0 | Freq. Percent Cum.

------------+-----------------------------------

0 | 1 0.48 0.48

1 | 206 99.52 100.00

------------+-----------------------------------

Total | 207 100.00tab do you belong to cooperative society

Do you |

belong to |

cooperative |

society, |

Yes=1 No=0 | Freq. Percent Cum.

------------+-----------------------------------

0 | 44 21.26 21.26

1 | 163 78.74 100.00

------------+-----------------------------------

Total | 207 100.00tab number of cooperative range12134243

Number of |

cooperative |

range, |

1-2=1, |

3-4=2, |

>4=3, |

None=4 | Freq. Percent Cum.

------------+-----------------------------------

1 | 153 73.91 73.91

2 | 8 3.86 77.78

3 | 2 0.97 78.74

4 | 44 21.26 100.00
------------+-----------------------------------
Total | 207 100.00tab years in cooperative range151610210
Years in |
cooperative |
range, |
1-5=1, |
6-10=2, |
>10=3, |
None=4 | Freq. Percent Cum.
------------+-----------------------------------
1 | 76 36.71 36.71
2 | 55 26.57 63.29
3 | 32 15.46 78.74
4 | 44 21.26 100.00
------------+-----------------------------------
Total | 207 100.00tab distance between house and farm11011
Distance |
between |
house and |
farm, |
1-10=1, |
11-20=2, |
>20=3 | Freq. Percent Cum.
------------+-----------------------------------
1 | 191 92.27 92.27
2 | 5 2.42 94.69
3 | 11 5.31 100.00
------------+-----------------------------------
Total | 207 100.00 tab var19
what is |
your |
primary |
occupation, |
farming=1, |
non |
farming=2 | Freq. Percent Cum.
------------+-----------------------------------
1 | 191 92.27 92.27
2 | 16 7.73 100.00

----------+-----------------------------------
Total | 207 100.00tab do you have access to credites1no0

Do you have |
access to |
credit, |
Yes=1, No=0 | Freq. Percent Cum.
----------+-----------------------------------
0 | 151 72.95 72.95
1 | 56 27.05 100.00
----------+-----------------------------------
Total | 207 100.00tab nfdp range50000151100000210000003n

NFDP range, |

<50000=1, |
51-100000=2 |
, |
>100000=3, |
None=4 | Freq. Percent Cum.
----------+-----------------------------------
1 | 1 0.48 0.48
2 | 3 1.45 1.93
3 | 4 1.93 3.86
4 | 199 96.14 100.00
----------+-----------------------------------
Total | 207 100.00tab boa range 500001511000002100000 3no

BOA range, |
<50000=1, |
51-100000=2 |
, |
>100000=3, |
None=4 | Freq. Percent Cum.
----------+-----------------------------------
1 | 6 2.90 2.90
2 | 2 0.97 3.86
3 | 5 2.42 6.28
4 | 194 93.72 100.00
----------+-----------------------------------
Total | 207 100.00 tab commercial range50000151100000210

Commercial |
range, |
<50000=1, |

51-100000=2 |
, |
>100000=3, |
None=4 | Freq. Percent Cum.
------------+-----------------------------------
3 | 5 2.42 2.42
4 | 202 97.58 100.00
------------+-----------------------------------
Total | 207 100.00tab cooperative range5000015110000021

Cooperative |
range, |
<50000=1, |
51-100000=2 |
, |
>100000=3, |
None=4 | Freq. Percent Cum.
------------+-----------------------------------
1 | 5 2.42 2.42

2 | 3 1.45 3.86
3 | 14 6.76 10.63
4 | 185 89.37 100.00
------------+-----------------------------------
Total | 207 100.00 tab friend famil yrange 500001511000002

Friend/fami |
ly range, |
<50000=1, |
51-100000=2 |
, |
>100000=3, |
None=4 | Freq. Percent Cum.
------------+-----------------------------------
1 | 9 4.35 4.35
2 | 3 1.45 5.80
3 | 6 2.90 8.70
4 | 189 91.30 100.00
------------+-----------------------------------
Total | 207 100.00 tab what other agricultural enterprises

What other |
agricultura |

l |
enterprises |
are you |
into apart |
from cereal |
crops, |
staple	Freq. Percent Cum.
0	8 3.86 3.86
1	27 13.04 16.91
2	115 55.56 72.46
3	55 26.57 99.03
4	2 0.97 100.00
Total	207 100.00

tab did you participated in off farm activ

Did you |
participate |
d in |
off-farm |
activities? |
Yes=1,No=0	Freq. Percent Cum.
0	75 36.23 36.23
1	132 63.77 100.00
Total	207 100.00

. clear

. edit

. *(11 variables, 207 observations pasted into data editor)

. summarize

Variable	Obs Mean Std. Dev. Min Max
age	207 39.42512 10.67585 18 69
yearsinsch~l	207 12.40097 4.180235 0 18
householss~e	207 15.13043 11.88649 2 63
farmingexp	207 20.48309 11.20413 2 50
farmsize	207 4.199034 2.755436 1 20

farmsizera~0	207	3.47343	1.403193	1	5
income	207	481034.8	596901.9	1200	2500000
extension	207	2.144928	2.160605	0	8
numbersofc~p	207	1.183575	.9004426	0	5
yearsincop~y	207	6.309179	6.119447	0	30
whatsthedi~e	207	5.806763	7.573674	1	47

. log closename: <unnamed>
log: C:\Users\Olajide\Desktop\Samuel Food security and Povert.log
log type: text
opened on: 17 Nov 2019, 08:52:29tab foodsecuritysecured1notsecure0

Objective 2 FOOD |
SECURITY, |
Secured=1, |
Not |

secure=0	Freq.	Percent	Cum.
0	124	59.90	59.90
1	83	40.10	100.00
Total	207	100.00	

tab poverty status poor1 non poor 0 name: <unnamed>
log: C:\Users\Olajide\Desktop\FOOD SECURITY SAMUEL
OBJECTIVE 3.log
log type: text
opened on: 17 Nov 2019, 09:02:30 logit foodsecurity age yearsinschool householssize farmsize farmingexp yearsincoperativesociety income n0ofextcontact whatsthedist
> ancebetweenyourhouse

Iteration 0: log likelihood = -141.38948
Iteration 1: log likelihood = -110.54818
Iteration 2: log likelihood = -109.81949
Iteration 3: log likelihood = -109.81242
Iteration 4: log likelihood = -109.81242

Logistic regression	Number of obs	= 205
	LR chi2(9)	= 63.15
	Prob > chi2	= 0.0000
Log likelihood = -109.81242	Pseudo R2	= 0.4033

foodsecurity	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
age	.0259014	.022517	1.15	0.250	-.0182312	.0700339
yearsinsch~l	-.1309526	.0516433	-2.54	0.011	-.2321715	-.0297336
householss~e	-.0879951	.0177317	-4.96	0.000	-.1227486	-.0532416
farmsize	.0334505	.0617375	0.54	0.588	-.0875528	.1544538
farmingexp	-.0285454	.0216119	-1.32	0.187	-.070904	.0138131
yearsincop~y	-.0764044	.0333766	-2.29	0.022	-.1418213	-.0109874
income	2.38e-06	7.13e-07	3.34	0.001	9.86e-07	3.78e-06
n0ofextcon~t	.3425258	.1023572	3.35	0.001	.1419093	.5431423
whatsthedi~e	-.0320356	.0220857	-1.45	0.147	-.0753228	.0112516
_cons	1.64747	1.048039	1.57	0.116	-.4066495	3.701589

. log close
name: <unnamed>
log: C:\Users\Olajide\Desktop\FOOD SECURITY SAMUEL **OBJECTIVE 3**.log
log type: text
closed on: 17 Nov 2019, 09:03:10

Poverty |
Status, |
Poor=1, Non |

poor=0	Freq.	Percent	Cum.
0	121	58.45	58.45
1	86	41.55	100.00
Total	207	100.00	

log close
name: <unnamed>
log: C:\Users\Olajide\Desktop\Samuel Food security and Povert.log
log type: text

closed on: 17 Nov 2019, 08:53:06

---

name: <unnamed>
log: C:\Users\Olajide\Desktop\Samuel **Objective 3 Poverty**.log
log type: text

opened on: 17 Nov 2019, 08:19:17 logit povertystatus age yearsinschool householssize farmsize farmingexp yearsincoperativesociety income n0ofextcontact whatsthedis
> tancebetweenyourhouse

Iteration 0: log likelihood = -140.80221
Iteration 1: log likelihood = -111.15873
Iteration 2: log likelihood = -110.32614
Iteration 3: log likelihood = -110.31647
Iteration 4: log likelihood = -110.31647

Logistic regression Number of obs = 205
LR chi2(9) = 60.97
Prob > chi2 = 0.0000
Log likelihood = -110.31647 Pseudo R2 = 0.4165

povertysta~s	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
age	.0235097	.0224733	1.05	0.296	-.0205371	.0675565
yearsinsch~l	-.1220496	.0513578	-2.38	0.017	-.2227091	-.02139
householss~e	-.0870672	.0176539	-4.93	0.000	-.1216682	-.0524661
farmsize	.0257469	.0615034	0.42	0.675	-.0947976	.1462915
farmingexp	-.0261161	.0215557	-1.21	0.226	-.0683645	.0161322
yearsincop~y	-.0744405	.0331811	-2.24	0.025	-.1394744	-.0094067
income	-2.45e-06	7.25e-07	3.38	0.001	-1.03e-06	3.87e-06
n0ofextcon~t	.3250207	.1019511	3.19	0.001	.1252002	.5248412
whatsthedi~e	-.0332367	.0219309	-1.52	0.130	-.0762206	.0097471
_cons	1.67927	1.049089	1.60	0.109	-.376906	3.735447

. log close
name: <unnamed>

log: C:\Users\Olajide\Desktop\Samuel **Objective 3 Poverty**.log

log type: text

closed on: 17 Nov 2019, 08:19:55

name: <unnamed>

log: C:\Users\Olajide\Desktop\Multiple regression samuel.log

log type: text

opened on: 18 Nov 2019, 22:56:08

Objective iv

```
. regress output sex age educationallevel householdsize farmsize farmingexperience seeds
quatityofferlizer labour membershipofcooper

> ative extension povertystatus foodsecurityln
Source |       SS       df       MS              Number of obs =     207
-------------+------------------------------   F( 13,   193) =   36.46
       Model |  18011.7683    13  1385.52064     Prob > F      =  0.0000
    Residual |  7333.54573   193  37.9976463     R-squared     =  0.7107
-------------+------------------------------   Adj R-squared =  0.6912
       Total |   25345.314   206  123.035505     Root MSE      =  6.1642

------------------------------------------------------------------------------
      output |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         sex |  -.0241088   .0563347    -0.43   0.669    -.1352194    .0870019
         age |  -2.772654    1.11696    -2.48   0.014    -4.975669   -.5696392
  educationa~l |  -1.246254   1.102394    -1.13   0.260     -3.42054    .9280326
 households~e |   .1064437   .1126606     0.94   0.346    -.1157604    .3286478
    farmsize |   .3696445   .2158007     1.71   0.088    -.0559861    .7952752
 farmingexp~e |   .6664927   .0370987    17.97   0.000     .5933218    .7396636
        seeds |   .0473719   1.396472     0.03   0.973    -2.706933    2.801677
 quatityoff~r |  -.5390194   .5415349    -1.00   0.321    -1.607106    .5290671
       labour |  -.0409739   .4231787    -0.10   0.923    -.8756227    .7936749
 membership~e |    -.7368   1.088805    -0.68   0.499    -2.884284    1.410684
    extension |    1.48333    .790989     1.88   0.062    -.0767626    3.043423
 povertysta~s |  -2.989123    .973753    -3.07   0.002    -4.909687   -1.068559
 foodsecuri~n |   3.968185   1.385092     2.86   0.005    -6.700045   -1.236326
        _cons |   35.14791   4.159589     8.45   0.000     26.94382     43.352
------------------------------------------------------------------------------

. regress output sexln ageln educationlevelln householdsizeln farmsizeln farmingexperienceln
seedquantityln quantityoffertilizerln l
> abourln membershipofcoopln extensionln povertystatusln foodsecurityln
      Source |       SS       df       MS              Number of obs =     207
-------------+------------------------------   F( 13,   193) =   21.65
       Model |  15034.8868    13  1156.52975     Prob > F      =  0.0000
    Residual |  10310.4272   193  53.4219026     R-squared     =  0.5932
-------------+------------------------------   Adj R-squared =  0.5658

       Total |   25345.314   206  123.035505     Root MSE      =   7.309

------------------------------------------------------------------------------

      output |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
```

```
-------------+------------------------------------------------------------------

        sexln |  -.0197513   2.594393    -0.01   0.994    -5.136754    5.097251

        ageln |  -4.324563   1.897672    -2.28   0.024    -8.067401   -.5817244

 educationl~n |   7.065982   3.255032    -2.17   0.031    -13.48598   -.6459803

 households~n |   1.657919   1.123424     1.48   0.142    -.5578454    3.873683

    farmsizeln |   2.310566   .8159735     2.83   0.005     .7011953    3.919936

 farmingexp~n |    12.3257   .9878256    12.48   0.000     10.37738    14.27402
 seedquanti~n |   3.622149   3.806844     0.95   0.343    -3.886211    11.13051
 quantityof~n |   -1.08686   1.400313    -0.78   0.439    -3.848742    1.675023
     labourln |    .357344   1.190396     0.30   0.764    -1.990512      2.7052
 membership~n |  -.6658666   1.882417    -0.35   0.724    -4.378617    3.046884
    extensionln |     3.8768   1.649548     2.35   0.020     .623345    7.130255
 povertysta~n |  -3.687415   1.738953    -2.12   0.035    -7.117208   -.2576217
 foodsecuri~n |   3.373241   1.697462     1.99   0.048     -6.7212   -.0252826
        _cons |   2.110403   9.649378     0.22   0.827    -16.92137    21.14218
------------------------------------------------------------------------------
. regress outputln sexln ageln educationlevelln householdsizeln farmsizeln farmingexperienceln
> seedquantityln quantityoffertilizerln
> labourln membershipofcoopln extensionln povertystatusln foodsecurityln

      Source |       SS       df       MS              Number of obs =     207
-------------+------------------------------           F( 13,   193) =   22.17
       Model |  9.58702316    13  .73746332             Prob > F      =  0.0000
    Residual |  6.41917007   193  .033259949            R-squared     =  0.5990
-------------+------------------------------           Adj R-squared =  0.5719
       Total |  16.0061932   206  .077699967            Root MSE      =  .18237

------------------------------------------------------------------------------
   outputln |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      sexln |  -.0117448   .0647347    -0.18   0.856    -.139423    .1159334
      ageln |  -.1014253   .0473502    -2.14   0.033    -.1948157   -.0080349
 educationl~n |   .2119394   .0812188     2.61   0.010    -.3721297    -.051749
 households~n |   .0474483   .0280314     1.69   0.092    -.0078389    .1027355
    farmsizeln |   .0481403    .02036     2.36   0.019     .0079837    .0882969
 farmingexp~n |   .3139842   .024648    12.74   0.000     .2653702    .3625982
 seedquanti~n |   .1277524   .0949875     1.34   0.180    -.0595944    .3150991
 quantityof~n |  -.0277412   .0349403    -0.79   0.428     -.096655    .0411726
     labourln |   .0047085   .0297025     0.16   0.874    -.0538746    .0632916
 membership~n |  -.0156492   .0469696    -0.33   0.739    -.1082889    .0769904
```

```
extensionln |   .0871555   .0411591     2.12   0.035     .0059761     .168335

povertysta~n |  -.0960534   .0433899    -2.21   0.028    -.1816327    -.010474
foodsecuri~n |   .0854759   .0423547     2.02   0.045    -.1690133   -.0019384
       _cons |    2.73288   .2407689    11.35   0.000     2.258003    3.207756
------------------------------------------------------------------------------
. regress outputln sex age educationallevel householdsize farmsize farmingexperience seeds
quatityofferlizer labour membershipofcoop
> erative extension povertystatus foodsecuritysecured1notsecure0

      Source |       SS       df       MS              Number of obs =     207
-------------+------------------------------           F( 13,   193) =   31.54

       Model |  10.8828529    13  .837142529            Prob > F      =  0.0000

    Residual |  5.12334036   193  .026545805            R-squared     =  0.6799

-------------+------------------------------           Adj R-squared =  0.6584

       Total |  16.0061932   206  .077699967            Root MSE      =  .16293

------------------------------------------------------------------------------
   outputln |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
        sex |  -.0010945    .001489    -0.74   0.463    -.0040313    .0018423
        age |  -.0670784   .0295228    -2.27   0.024    -.1253071   -.0088497
 educationa~l |  -.0428418   .0291378    -1.47   0.143    -.1003112    .0146275
households~e |   .0039707   .0029778     1.33   0.184    -.0019024    .0098439
    farmsize |   .0035872   .0057039     0.63   0.530    -.0076628    .0148372
farmingexp~e |   .0165031   .0009806    16.83   0.000     .0145691    .0184371
       seeds |   .0166859   .0369107     0.45   0.652    -.0561142    .0894859
quatityoff~r |  -.0130507   .0143135    -0.91   0.363    -.0412817    .0151802
      labour |  -.0014084   .0111852    -0.13   0.900    -.0234693    .0206525
membership~e |  -.0173195   .0287786    -0.60   0.548    -.0740804    .0394415
   extension |   .0335324   .0209069     1.60   0.110    -.007703     .0747678
povertysta~s |  -.0778998   .0257376    -3.03   0.003    -.1286629   -.0271366
foodsecuri~0 |   .0677898    .025376     2.67   0.008    -.1178398   -.0177399
       _cons |    3.62462   .1196018    30.31   0.000     3.388725    3.860514
------------------------------------------------------------------------------
. log close
      name:  <unnamed>
       log:  C:\Users\Olajide\Desktop\Multiple regression samuel.log
  log type:  text
 closed on:  18 Nov 2019, 23:02:40
```

---

name: <unnamed>
log: C:\Users\Olajide\Desktop**Samuel Objective V** (Constraints).log
log type: text
opened on: 16 Nov 2019, 08:25:01

. tab flooding very serious 3serious2nots

Flooding, |
Very |
serious=3, |
Serious=2, |
Not |
serious=1	Freq. Percent Cum.
1	41 19.81 19.81
2	46 22.22 42.03
3	120 57.97 100.00
Total	207 100.00

. tab problem of weed very serious 3 serious

Problem of |
weed, Very |
serious=3, |
Serious=2, |
Not |
serious=1	Freq. Percent Cum.
1	56 27.05 27.05
2	59 28.50 55.56
3	92 44.44 100.00
Total	207 100.00

. tab inadequate irrigation facilities ve

Inadequate |
irrigation |
facilities, |
Very |
serious=3, |
Serious=2, |

Not |
serious=1	Freq. Percent Cum.
1	32 15.46 15.46
2	97 46.86 62.32
3	78 37.68 100.00
Total	207 100.00

. tab inadequate supply of inputs very seri

Inadequate |
supply of |
inputs, |
Very |
serious=3, |
Serious=2, |
Not |
serious=1	Freq. Percent Cum.
1	28 13.53 13.53
2	97 46.86 60.39
3	82 39.61 100.00
Total	207 100.00

. tab inadequate extension advisory servi

Inadequate |
extension |
advisory |
services, |
Very |
serious=3, |
Serious=2, |
Not |
serious=1	Freq. Percent Cum.
1	74 35.75 35.75
2	86 41.55 77.29
3	47 22.71 100.00
Total	207 100.00

. tab inadequate improved seed for plantin

Inadequate |
improved |
seed for |
planting, |
Very |
serious=3, |
Serious=2, |
Not |
serious=1	Freq. Percent Cum.
1	34 16.43 16.43
2	101 48.79 65.22
3	72 34.78 100.00
Total	207 100.00

. tab poor fertility of the soil very seriou

Poor |
fertility |
of the |
soil, Very |
serious=3, |
Serious=2, |
Not |
serious=1	Freq. Percent Cum.
1	62 29.95 29.95
2	43 20.77 50.72
3	102 49.28 100.00
Total	207 100.00

. tab high cost of hired labour very serious

High cost |
of hired |
labour, |
Very |
serious=3, |
Serious=2, |
Not |
serious=1	Freq. Percent Cum.

```
          1 |        28       13.53       13.53
          2 |        80       38.65       52.17
          3 |        99       47.83      100.00
------------+-----------------------------------
      Total |       207      100.00
. tab inadequate information on cereal cro

 Inadequate |
information |
  on cereal |
 crops, Very |
  serious=3, |
  Serious=2, |
        Not |
serious=1 |      Freq.     Percent        Cum.
------------+-----------------------------------
          1 |        52       25.12       25.12
          2 |        84       40.58       65.70
          3 |        71       34.30      100.00
------------+-----------------------------------
      Total |       207      100.00
. tab lack of storage facility very serious

      Lack of |
      storage |
     facility, |
         Very |
     serious=3, |
     Serious=2, |
           Not |
serious=1 |      Freq.     Percent        Cum.
------------+-----------------------------------
          1 |        46       22.22       22.22
          2 |        59       28.50       50.72
          3 |       102       49.28      100.00
------------+-----------------------------------
      Total |       207      100.00
. tab laborious nature of production very s

 Laborious |
   nature of |
 production, |
        Very |
```

serious=3, |
Serious=2, |
Not |
serious=1 | Freq. Percent Cum.
---|---|---|---
1 | 51 24.64 24.64
2 | 73 35.27 59.90
3 | 83 40.10 100.00
---|---|---|---
Total | 207 100.00

. tab incidence of pest and diseases very se

Incidence |
of pest and |
diseases, |
Very |
serious=3, |
Serious=2, |
Not |
serious=1 | Freq. Percent Cum.
---|---|---|---
1 | 42 20.29 20.29
2 | 111 53.62 73.91
3 | 54 26.09 100.00
---|---|---|---
Total | 207 100.00

. tab lack of credit facilities very seriou

Lack of |
credit |
facilities, |
Very |
serious=3, |
Serious=2, |
Not |
serious=1 | Freq. Percent Cum.
---|---|---|---
1 | 49 23.67 23.67
2 | 37 17.87 41.55
3 | 121 58.45 100.00
---|---|---|---
Total | 207 100.00

. tab inadequate farm land very serious3se

Inadequate farmland, Very serious=3, Serious=2, Not serious=1	Freq.	Percent	Cum.
1	44	21.26	21.26
2	74	35.75	57.00
3	89	43.00	100.00
Total	207	100.00	

. tab problem of road networks linking mark

Problem of road networks linking markets,Very serious=3, Serious=2, Not serious=	Freq.	Percent	Cum.
1	25	12.08	12.08
2	36	17.39	29.47
3	146	70.53	100.00
Total	207	100.00	

. summarize

Variable	Obs	Mean	Std. Dev.	Min	Max
floodingve~s	207	2.381643	.7969914	1	3
problemofw~s	207	2.173913	.8294902	1	3
inadequat~ve	207	2.222222	.6959584	1	3
inadequat~ri	207	2.26087	.6823469	1	3
inadequat~vi	207	1.869565	.7551707	1	3

inadequate~n	207	2.183575	.6933252	1	3
poorfertil~u	207	2.193237	.8709735	1	3
highcostof~s	207	2.342995	.7058952	1	3
inadequate~o	207	2.091787	.7672168	1	3
lackofstor~s	207	2.270531	.8030592	1	3
laboriousn~s	207	2.154589	.7914996	1	3
incidenceo~e	207	2.057971	.6801783	1	3
lackofcred~u	207	2.347826	.8388519	1	3
inadequat~se	207	2.217391	.7733968	1	3
problemofr~k	207	2.584541	.6976748	1	3

name: <unnamed>
log: C:\Users\Olajide\Desktop\Samuel **Objective V (Constraints)**.log
name: <unnamed>
log: C:\Users\Olajide\Desktop**Hypothesis One Samuel**.log
log type: text
opened on: 17 Nov 2019, 11:10:50

. pwcorr foodsecurity age yearsinschool householssize farmsize farmingexp yearsincoperativesociety income n0ofextcontact whatsthedis
> tancebetweenyourhouse, sig

	foodse~y	age	yearsi~l	househ~e	farmsize	farmin~p	yearsi~y
foodsecurity	1.0000						
age	0.0206	1.0000					
	0.7688						
yearsinsch~l	-0.2089	0.0026	1.0000				
	0.0025	0.9706					
householss~e	-0.3062	-0.1719	0.1621	1.0000			
	0.0000	0.0133	0.0196				
farmsize	0.0329	0.0069	-0.0616	-0.1340	1.0000		
	0.6380	0.9209	0.3777	0.0542			
farmingexp	-0.0131	0.7000	-0.0741	-0.2959	0.1346	1.0000	
	0.8514	0.0000	0.2885	0.0000	0.0532		

```
                                                |
yearsincop~y |  -0.0326   0.2604   0.0226  -0.0238  -0.0942   0.2209   1.0000
             |   0.6426   0.0002   0.7472   0.7347   0.1791   0.0015
                                                |
      income |   0.2348   0.0075  -0.1107   0.0083  -0.0041  -0.0263   0.2303
             |   0.0007   0.9143   0.1123   0.9060   0.9532   0.7069   0.0009
                                                |
n0ofextcon~t |   0.0923  -0.0896   0.0806   0.2830  -0.1458  -0.2076   0.3228
             |   0.1860   0.1992   0.2483   0.0000   0.0361   0.0027   0.0000
                                                |
whatsthedi~e |  -0.0732   0.0169   0.0468  -0.1166   0.1313  -0.0185  -0.1576
             |   0.2943   0.8093   0.5034   0.0942   0.0592   0.7918   0.0240
                                                |


             |   income n0ofex~t whatst~e
-------------+---------------------------
      income |   1.0000
                                                |
                                                |
n0ofextcon~t |   0.0298   1.0000
             |   0.6696
                                                |
whatsthedi~e |  -0.0918  -0.0997   1.0000
             |   0.1882   0.1528
                                                |
name:  <unnamed>
log:  C:\Users\Olajide\Desktop\Hypothesis One Samuel.log
log type:  text
closed on:  17 Nov 2019, 11:13:10
```