EFFECT OF OFF-FARM INCOME DIVERSIFICATION ON LIVELIHOOD OF SMALL-SCALE CROP FARMERS IN SELECTED LOCAL GOVERNMENT AREAS OF NIGER STATE, NIGERIA

BY

YAHAYA, Jamila
MTech/SAAT/2017/7473

DEPARTMENT OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT
FEDERAL UNIVERSITY OF TECHNOLOGY
MINNA

OCTOBER, 2021

EFFECT OF OFF-FARM INCOME DIVERSIFICATION ON LIVELIHOOD OF SMALL-SCALE CROP FARMERS IN SELECTED LOCAL GOVERNMENT AREAS OF NIGER STATE, NIGERIA

BY

YAHAYA, Jamila
MTech/SAAT/2017/7473

A THESIS SUBMITTED TO THE POSTGRADUATE SCHOOL OF FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE, NIGERIA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF TECHNOLOGY (MTECH) IN AGRICULTURAL ECONOMICS

OCTOBER, 2021

ABSTRACT

This study analyzed the effect of off-farm income activities on livelihood of small-scale crop farmers in Niger State, Nigeria. The specific objectives were to describe the socio-economic characteristics of the small-scale crop farmers; examine their off-farm income activities, livelihood status and constraints mitigating small-scale farmers to diversify into off-farm activities in the study area. Multi-stage random sampling procedure was employed to select 241small-scale crop farmers on which structured questionnaire was administered. Primary data collected were analyzed with descriptive statistics such as frequency counts, percentages and mean, and inferential statistics such as Tobit regression. Livelihood index was used to examine the livelihood status of the farmers. Findings from the study revealed that the mean age of the respondents was 49year, mean household size was 7 people, mean farming experience was 12.5 years and mean farm size was 2.10 hectares. Meanwhile, 68.9% of the respondents were males, 83.4% were married and 61.0% had formal education with a mean of 9 years in formal schooling. The major off-farm income activities of the respondents examined were marketing (51.9%), petty trading (23.2%) and commission agents (18.7%) ranked 1^{st}, 2^{nd} and 3^{rd}, respectively. Based on the livelihood index classification, majority (75.1%) of the respondents were found to have low livelihood status. Tobit regression result revealed that sex (1.76, $p<0.1$), household size (2.97, $p<0.01$), education (4.16, $p<0.01$), experience (2.25, $p<0.05$), farm size (2.03, $p<0.05$), access to credit (2.16, $p<0.05$), extension contact (2.24, $p<0.05$), cooperative (3.84, $p<0.01$) and off-farm income (10.40, $p<0.01$) were statistically significant, thus had effect on livelihood status of the small-scale crop farmers. Major constraints identified to mitigate against diversification into off-farm income activities were inadequate capital ($\overline{X}=4.46$), climatic risk and uncertainties ($\overline{X}=3.97$) and poor marketing facilities ($\overline{X}=3.80$) ranked 1^{st}, 2^{nd} and 3^{rd}, respectively among others. In conclusion, the small-scale farmers were in their most productive stage of life where they could engaged in off-farm income activities which has significant effect on the livelihood status of the small-scale crop farmers in the study area. It was therefore recommended that credit facilities should be provided for small-scale farmers by financial institutions in order to increase their participation in off-farm income activities.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AWE:	-	Agricultural Wage Employment
EDC:	-	Education Development Centre
CREDO:	-	Curriculum Renewal and Education Development Overseas.
IFAD:	-	International Fund for Agricultural Development
NAWE:	-	Non-Agricultural Wage Employment
NERDC:	-	National Education Research Development Council
NSSP:	-	Nigeria Social Studies Programme
NUT:	-	Nigeria Union of Teachers
RNF:	-	Rural Non-Farm
SE:	-	Self-Employment
SR:	-	Stimulus Response
SRL:	-	Sustainable Rural Livelihood
SUBEB:	-	State Universal Basic Education Board
USA:	-	United State of America
USAID:	-	United States Agency for International Development

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Agricultural sector has remained an important sector in the Nigerian economy both in pre and post-independence era. Despite the oil boom, it has always contributed by providing employment opportunities for the teeming population, eradicating poverty and enhancing the overall growth and development of the Nigerian economy. According to Kamil *et al.* (2017), agriculture occupied a vital place in national economic growth and development in Sub-Saharan Africa. Thus, agricultural sector provides food for the population, employs people through wealth creation and makes available raw materials for the manufacturing sector. It also serves as source of foreign earning to a nation particularly developing nations which Nigeria is inclusive.

Daudu *et al.* (2014) posited that agriculture has been contributing to Nigeria's Gross Domestic Product (GDP) since independence. For instance, the sector contributed 56% to the country's GDP between the period of 1960 to 1964; 47% between the period of 1965 to 1969 and 35% from 2002 to 2004 with crop production contributing about 85% of the total. Recently, agriculture contributed 24.45% to Gross Domestic Product (GDP) as at the end of 2020 (National Bureau of Statistic [NBS], 2021).

Underscoring the importance of agriculture to national economic growth and development, the Federal Government of Nigeria had introduced some interventions aimed at enhancing the livelihood of rural farmers and agriculture in general. Daneji (2011) categorized these interventions as policy-based and agency-based interventions. At the policy level, the author identified: National Accelerated Food Production Programme (NAFPP) launched in 1970, Operation Feed the Nation (OFN) in 1976 and Green Revolution Programme (GR) in 1979, while at the agency-based interventions

include National Agricultural Land Development Authority (NALDA) launched in 1991, River Basin Development Authority (RBDA) in 1977, Agricultural Development Programmes (ADPs) in 1975, Directorate of Food, Road and Rural Infrastructure (DFRRI) in 1986.

Other interventions according to Ogbanje (2015), that are aimed at meeting the genuine financial needs of the Nigerian farmers include Family Economic Advancement Programme (FEAP) launched in 1986, Nigerian Agricultural Credit Bank (NACB) now Bank of Agriculture (BOA) in 1973, Agricultural Credit Guarantee Scheme Fund (ACGS) in 1973, Microfinance institutions in 1986, National Special Programme for Food Security (NSPFS) in 2002 and National Fadama Development Programme (NFDP) in 2003.

These policies and intervention projects had in one way or the other contributed towards enhancement of agricultural sector for national growth and development as well as improving the livelihood of the rural farmers who are largely operating on a small-scale basis. According to Adewale *et al.* (2015), Nigeria's agricultural policies and intervention programs made appreciable contribution in increasing agricultural productivity and improving the livelihood of her citizen.

Most crop farmers in Nigeria especially the rural areas are small-scale farmers who rely heavily in agriculture to provide for their socio-economic needs. In most cases, after the harvest season they rarely have any other occupation to supplement and complement their income (Shehu and Abubakar, 2015). Ajayi *et al.* (2016) stated that the condition of farmers especially in the rural situation has adverse repercussions on their livelihood and make them susceptible to various risks which threaten their sustenance. Therefore, there

is the need to diversify income sources of the small-scale crop farmers through off-farm activities in order to improve their livelihood.

Meanwhile, agrarian man has relied on off-farm income sources like hunting, trading, artisanal mining and other trades from time immemorial in order to survive severe droughts and even migration (Mtocha, 2015). Therefore, off-farm income activities are those extra-agricultural jobs which farmers engage in to complement and supplement their income. It is the extra income derived from other sources that are not farm-related. According to Loison (2015), off-farm income is that portion of household income which is obtained off the farm. It includes non-farm wages and salaries, trading and interest on farm income given out as loan, and share dividend earned by farm families.

In developing countries like Nigeria, off-farm income activities play a vital role in sustainable development and poverty reduction in rural areas (Shehu and Abubakar, 2015). It reduces the pressure of unemployment and the demand for land by the poor in rural areas; contributes to breaking down the vicious cycle of poverty among the rural populace and the income obtained from off-farm activities can significantly increase total household income and hence enhance the investment capacity in farm activities (Babatunde *et al.,* 2010). Therefore, off-farm income activities is often a source of savings, which plays an important role in food security and livelihood. The households that diversify their income by participating in off-farm income activities are more capable of overcoming negative shocks from poor harvest (Myyra *et al.,* 2011).

In Nigeria, small-scale crop farmers earn their livelihoods through diverse sources, dispelling the traditional perception among most urban settlers that their income comes from farming alone. According to Loison and Bignebat (2017), rural households especially in Sub-Saharan Africa diversify their farm activities and by extension virtually

through working on other farms or engaging in natural resource related activities. The income diversification through off-farm activities comes by engaging in waged labour, self-employment or labour migration. Djurfeldt and Djurfeldt (2013) posited that rural households operate between on-farm and off-farm activities over time depending on the opportunities and circumstances on ground.

Off-farm economic activities may be a deliberate household strategy to secure survival, reduces risk, finance farm inputs and minimize income fluctuations (Reardon and Votsi, 2006). Thus, off-farm income diversification among small-scalecrop farmers is fast becoming an important income and livelihood technique (World Bank, 2007). Empirical studies across Africa had shown that off-farm activities had positive impacts on household incomes, wealth, consumption and nutrition among rural farmers (Reardon and Votsi, 2006; Davis *et al.*, 2010). Therefore, off-farm income diversification activities is of interest to policy makers because of its potential to contribute to poverty reduction and economic growth for improved livelihood.

1.2 Statement of the Research Problem

Agricultural activities (on-farm) has been recognized as the major source of livelihood for people leaving in rural areas. Most rural households are involved in agricultural activities such as livestock, crop or fish production as their main source of livelihood. In Nigeria, the agricultural sector is plagued with problems of soil fertility, inadequate infrastructures, farm risk and uncertainty as well as seasonality nature of agriculture production among others. Thus, rural households are encouraged to develop strategies to cope with increasing vulnerability associated with agricultural production through off-farm activities. Households who diversify into off-farm activities were found to be less vulnerable to shock compared to those who engaged solely in agricultural activities (Myyra *et al.*, 2011).

Despite the growing importance of off-farm activities, very few studies have been conducted about the role it plays on livelihood of rural households in developing countries like Nigeria and particularly, in the study area. There is also an erroneous impression that rural people are homogeneous in their activities implying that they hardly diversify into off-farm activities. This assumption has constituted a gap in knowledge that call for concerns from various researchers in agricultural sector. Thus, there is need to analyze the effect of off-farm income activities on livelihood of small–scale farmers in Niger State, Nigeria. In view of the aforementioned, the following research questions were formulated in an attempt to provide answers for in the study:

i. What are the socio-economic characteristics of small-scale crop farmers?
ii. What are the off-farm income diversification engaged in by the small-scale crop farmers?
iii. What are factors influencing small-scale crop farmers' off-farm income diversification?
iv. What is the livelihood status of the small-scale crop farmers?
v. What is the effect of off-farm income diversification on the livelihood of small-scale crop farmers?
vi. What are the constraints mitigating the small-scale crop farmers off-farm income diversification?

1.3 Aim and Objectives of the Study

The aim of the study is to analyze the effect of off-farm income diversification on livelihood of small-scale crop farmers in selected LGAs of Niger State, Nigeria.

The specific objectives of the study are to:

i. describe the socio-economic characteristics of the small-scale crop farmers;

ii. identify the off-farm income diversification engaged in by the small-scale crop farmers;

iii. determine the factors influencing the small-scale crop farmers' off-farm income diversification;

iv. examine the livelihood status of the small-scale crop farmers;

v. determine the effect of off-farm income diversification on the livelihood of small-scale crop farmers, and

vi. examine the constraints mitigating the small-scale crop farmers off-farm income diversification.

1.4 Hypotheses for the Study

The following null hypotheses were formulated in this study:

i. There is no significant relationship between the selected socio-economic characteristics of the small-scale crop farmers and their livelihood status.

ii. There is no significant relationship between the off-farm income diversification of the small-scale crop farmers and their livelihood status.

1.5 Justification of the Study

The outcome of this study entitled "Effect of Off-Farm Income Activities on Livelihood of Small-Scale Farmers in Niger State, Nigeria" will be of significance to various stakeholders. It is expected to increase the awareness and understanding of the nature of off-farm activities and how it affects household incomes in Niger State, Nigeria. It is also expected to make available empirical evidence to policy makers within and outside the government circles in formulating viable and workable policies and programmes aimed at supplementing and complementing on-farm incomes of the rural farmers.

In addition, effect of off-farm income is expected to increase and enhance the division of labour which is highly anticipated to go beyond the problem of surplus labour and marginal farming among the rural farmers in Niger State. Therefore, the incomes derived from off-farm activities by the rural farmers has the potential to overcome problem of inadequate rural labour, and makes it available all year round for increase agricultural productivity among rural farmers. This will in turn increase the labour output. Understanding how and why rural people change their income generating activities is a key to developing effective strategies to support this process.

Therefore, the findings of this study would be of great relevance to stakeholders in rural economy. This is because the results would facilitate an in-depth comprehension of structural change imminent in the agricultural sector. It will provide information on rural livelihood diversification that could help our understanding of the subject and provide basic and useful information that could assist researchers and policy makers interested in rural livelihoods especially with respect to design of appropriate strategies to improve the livelihood of the people.

Other researchers will find the outcome of the study relevant in expanding the frontiers of knowledge as it serve as a reference material for further researches. The exploration of the factors influencing off-farm income diversification is expected to help raise some policy issues and give policy direction to policy makers, especially, in profiling small-scale farmers particularly in the study area. It will help small-scale farmers access to resources and exposing them to opportunities that will enhance their income generation as well as improving their livelihood status.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

In this section, underlying theories relevant to the work were examined. These theories were labour supply theory, wage determination theory, human capital theory and optimal time allocation theory.

2.1.1 Labour supply theory

Labour supply could be defined as the total hours that a workers or employees are willing to work at a given wage rate. In the agricultural sector, labour supply comes basically from rural population/small-holder farmers and their families (Odozi *et al.,* 2018), while graduates trained in agriculture and related disciplines creates the pool of skilled labour for the agriculture industry (Nuga and Asimiea, 2015). Change in labour supply is usually affected by wage, suppose wages rise, labour supply could shift to right or left. Labour supply theory is determined within the same maximization context of consumption and saving choices as the utility function is assumed to depend on hours of leisure and consumption (Bjornsen and Mishra, 2012).

The determinants of labour allocation decisions of rural households often rely on the neo-classical assumptions of perfectly competitive factor markets and complete information, where the level of employment is simply determined by the intersection of the aggregate labour supply and aggregate labour demand (Tocco *et al.,* 2012; Bjornsen and Mishra, 2012). Also, the competitive market assumptions hold that labour market equilibrium is generated automatically as an efficient allocation where workers and firms find each other (Wallenius and Prescott, 2011).

Tocco *et al.* (2012) viewed labour supply decisions of farm household members as the result of household utility maximization, subject to constraints on time, income and farm production. The typical farm household is assumed to derive utility (U) from total consumption (C) and leisure (L), which may vary according to exogenous individual characteristics, such as human capital variables and general household characteristics (H), as well as locational characteristics (Z), such as labour market conditions. This is shown as in equation (1):

$$U = U(C, L, H, Z) \quad (1)$$

The household's maximization of the utility levels of consumption and leisure, dependent on individual and other characteristics, subject to the constraints of time, income and farm production. Total time endowment (T) is allocated between off-farm work (O), farm work (F) and leisure (L) given as in equation (2):

$$T = O + F + L \quad (2)$$

Total consumption in value terms (consumption of goods multiply by the price Pc) is constrained by the budget, determined by off-farm income (off-farm work O multiply by the market wage W), net farm income (the value of farm output P_fY_f subtract by the costs of production I_fX_f) and exogenous household wealth (V) also known as non-earned income is given as in equation (3):

$$CPc = WO + (P_fY_f - I_fX_f) + V \quad (3)$$

However, agricultural activities are characterized by decreasing marginal returns as on-farm labour is dependent on the production function which imposes the final constraint on the household's utility maximization given as in equation (4):

$$Q = f(F, X_f, H, Z_f) \quad (4)$$

Where the total production (Q) is a function of farm labour (F) and the quantity of purchased inputs (X_f), including farmland services and hired labour; the efficiency of farm production depends on human capital characteristics (H) as well as other exogenous farm specific characteristics (Z_f). This theoretical framework hereby outlined is the general one assuming that the household acts as a single decision maker.

2.1.2 Wage determination theory

Wage jobs are defined as those works which are paid for by outside employers (Kaya and Tigli, 2016). Wage labour is a short-term labour agreement payable in cash or kind after completing agreed tasks (Mtocha, 2015). According to Ojumu (2016), wage labour could help poor households to meet their regular basic household consumption needs. Also, it could help some families to avoid selling their food in an attempt to generate income for their basic needs. Assuming wage labour markets to be exogenous to household decisions, the returns-to-labour function becomes a linear one whose coefficient on working hours is a unit wage. The unit wage is a function of the human capital of the employee, which is a vector of individual and characteristics that affects his/her market wage, such as age, age squared, sex and education (El-Osta *et al.,* 2011). Once these individual characteristics are controlled, household characteristics would not directly affect workers' wage in the exogenous market.

Wage determination is the process of negotiation for wage and fringe benefit rates for each classification of labourers (Ojumu, 2016). It is also the process of setting wage rates or establishing wage structures in particular situation. Wages can be determined through the forces of demand and supply, government policies, productivity level, cost of living, occupation types and trade unions (Ojumu, 2016). Meanwhile, pricing of labour which is based on classical theories has lost its validity due to the fact that the macro-economic assumptions had become insufficient. The labour economy system of today is bound to

functioning by neo-classical theory which is based on the wage mechanism in micro-economic solutions (Kaya and Tigli, 2016).

Kaya and Tigli (2016) further posited that classical theory postulates that the output price of labour and aggregate output are determined in the labour market due to employment and competitive conditions. Based on the classical theory, labour is the unique value in the markets. However, neo-classical theory on the other hand posited that if the price of labour is on decreasing tendency, employment increases; while the marginal productivity decreases. A key factor in determining the time allocation decisions of the farm household is the wage rate, which represents the opportunity cost of leisure.

According to Tocco *et al.* (2012), in the neo-classical model, an increase in the wage rate has an unpredictable effect on labour supply decisions due to two opposing effects: it can cause the individual to work more, due to the higher return of work time (substitution effect), or it may lead to work less time, because the same amount of income can be earned by working less and thus more leisure time can be afforded (income effect). Whichever effect dominates will determine the impact on the hours/days allocated to work. On the other hand, as predicted in the theory, an increase in non-labour income (or the so-called non-earned income) will only lead to an income effect, causing the individual to work less. Off-farm labour demand, in terms of the offered wage and the number of job opportunities, has often been accounted for when analyzing off-farm labour supply (Tocco *et al.*, 2012).

For instance, wage equations have been estimated in several studies to provide predicted wages, or potential wages, for individuals who do not participate in the off-farm market or when wage values are not available from the data. As outlined in the theoretical

framework, the off-farm wage (W) is assumed to reflect individual human capital characteristics (H) as well as labour market conditions (Z) given as in equation (5):

$$W = W(H, Z) \quad (5)$$

Thus, the hourly off-farm wage received by farm owners could be regress against human capital characteristics as well as labour market characteristics.

2.1.3 Human capital theory

Frank and Bemanke (2007) as in Shuaibu and Oladayo (2016) defines human capital as a set of factors such as education, experience, training, intelligence, energy, work habits, trustworthiness and initiative that affect the value of a worker's marginal product. The role of human capital is widely discussed in economic development, productivity analysis, innovation, public policy and education. According to Leroy (2011), human capital theory refers to aggregate stock of competencies, knowledge, social and personal attributes embodied in the ability to create intrinsic and measurable economic value. The theory view humans and individuals as an economic units acting as their own economy premise on four basic assumptions of individualism, rationality, private property right and market economy (Shuaibu and Oladayo, 2016).

The basic concept of human capital theory is that the investments of an individuals can be mathematically measured based on the economic value they are able to contribute to society. Measuring economic human capital and its return on investment is a vital aspect of the proposed theory. Consumer economics and financial planning often measures the value of current choices versus their long run returns and implications. The theory allows individuals to make decisions about the inherent cost of future opportunities weighted with the opportunity cost of present situations and concludes that investment in human capital will lead to greater economic outputs (Leroy, 2011).

Human capital theory was first developed by Becker (1975) to explain both individuals' decisions to invest on human capital and the pattern of individuals' lifetime earnings. Human capital encompasses all forms of investments made to improve human skills, including schooling, informal education, on-the-job training, and learning by doing (Ali *et al.*, 2018). It also includes other factors that facilitate the productive use of human skills, such as health. Thus, human capital investment and labour market earnings are among the main determinants of rural livelihood. However, human capital theory was later reconstructed by El-Osta *et al.* (2011) by adapting the human capital model presented by Wilson and Briscoe (2004).

The economic decisions of the individual (referred to as the farm operator) is characterized by Wilson and Briscoe (2004) which is the marginal rate of transformation in educational attainment to income. Therefore, for the farm operator, a change in the level of schooling will be associated with a change in expected income. The relative utility of schooling and marginal utility of consumption for the farm operator will depend on the marginal rate of substitution of consumption of good and services. Thus, the farm operator will continue to seek higher levels of schooling until the marginal utility benefits equal the marginal utility costs.

Human capital theory is the dominant approach for understanding personal income distribution (Blair, 2018). According to the author, individual income is the result of 'human capital'. The idea is that human capital makes people more productive leading to higher income. In a market economy, each factor of production would earn its marginal product. Let's assumes that education, age and firm experience all contribute to an individual's aggregate stock of human capital K as shown in equation (6):

$$K = c1\,(\text{education}) + c2\,(\text{age}) + c3\,(\text{firm experience}) \quad (6)$$

The human capital theory provides no way of determining these parameters c1, c2, and c3. Instead, econometricians typically estimate them using multivariate regression. This chooses parameters such that K has the maximum effect on income.

Improving human capital in Africa has become a major discourse among economists, researchers and policymakers (Shuaibu and Oladayo, 2016). Early theories of human capital opined that investment in education and training develops human capital. The neo-classical theory identifies social class, work environment, employment status, income, housing conditions, pollution, education, diet and lifestyle as major determinants of healthy living. The neo-classical model opines that individual demand good livelihood for two reasons: first, for enhanced economic productivity; and second, for activities such as leisure.

Meanwhile, individual's capability to have various functioning vectors and to enjoy the corresponding well-being is the best indicator of welfare. The capability approach attaches relevance to the role of institutions for human development. De Muro and Tridico (2008) observe that the links between institution and human development are complex because human development is a multi-dimensional concept. The Institutional and development policies must come together to create equal development opportunities for all, in order to improve the standard of living. Therefore, the algebraic model can be specified as in equation (7):

$$HD = f(Z) \quad (7)$$

Where;

HD is human development,

Z is a vector of exogenous capability shifters.

2.1.4 Optimal time allocation theory

The theory of optimal allocation of time is defined as the process whereby an organization determines how best to apportion its factors of production between the various productive activities engaged in (Bower, 2017). This theory incorporates farm production and off-farm earnings in order to provide a framework for assessing the interplay between work choices and farm capital investments (Ahituv and Kimhi, 2002; Bower, 2017). For simplicity, intra-household time allocation is ignored while a single-person household is assumed. Skoufias (1996) formulated such a model with more than one family member.

A farmer is assumed to maximize lifetime income, derived from two sources: farm profits and off-farm labour earnings. He has one unit of time in each period to divide between off-farm work (L) and farm work (1_L). Farm production is a positive function of farm work, intrinsic ability (A), farm-specific human capital (hf), physical capital (K), fixed inputs (including land), purchased inputs (including hired workers), and a stochastic productivity shock (*h*). This shock is exogenous to the farm and is showed up at the beginning of each period. The assumption of fixed land is supported by evidence from developing countries like Ghana, Cameroun and Nigeria. In Israel, farmland transactions were not allowed as elastic supply of hired labour is assumed not a perfect substitute for own labour.

Although, several authors (Benjamin, 1992; Ahituv and Kimhi, 2002; Leroy, 2011; Tocco *et al.*, 2012) were not able to reject the perfect substitution hypothesis, others believed that it was unreasonable and found evidence against it (Frisvold, 1994; Kwon, 2009; Wallenius and Prescott, 2011). However, the equation for optimal time allocation could be derived by expressing off-farm income (L) as a function of intrinsic ability (A), wage rate (Wc), off-farm-specific human capital (Hc) and off-farm work time (T) as shown in equation (8).

$$L = f(A, Wc, Hc, T) \quad (8)$$

This expression represents the marginal contribution to income from off-farm activities. Thus, the equation showed that the values of the marginal unit of time spent in each activity were equalized which is very useful for assessing which exogenous factors increased the likelihood that the farmer will chose to be involved in either on-farm or off-farm activities (Ahituv and Kimhi, 2002; Kwon, 2009; Tocco *et al.,* 2012).

It is important to note that the farmer's ability plays an important role in his time allocation decision (El-Osta *et al.,* 2011). However, since ability was presumed to affect both on-farm and off-farm income in the same direction, its effect on the off-farm activities could be ambiguous. In a situation where off-farm wages are high, more farmers would participate in off-farm work, while the opposite would occur when farm profits are high. Thus, past decisions making could affect present decisions through the accumulation of sector-specific human capital. A person who worked off the farm in the past could be more likely to do so in the current period (persistence). Finally, time allocation and capital investments were inter-related, although, the sign of the relation is ambiguous (El-Osta *et al.,* 2011; Tocco *et al.,* 2012).

2.2 Conceptual Framework

2.2.1 Concept of off-farm activities

Off-farm activities refer to agricultural activities which take place outside the farmers' own farm such as agricultural wage or exchange labour and natural resource extraction especially charcoal making (Tenaw, 2016). According to Dadi (2016), off-farm activities which are carryout in someone else farm include wage labour, natural resource based activities like firewood/grass and charcoal selling. The off-farm activities in which rural communities participate were petty/local trading, remittance, handicrafts, selling wood

and wood products (firewood and charcoal). Others include selling of local drinks; transporting people and goods by using carts; salary from temporary or permanent employment; renting out of the idle or extra oxen; and income from mills (Mengistie and Kidane, 2016). Therefore, rural off-farm income activities involves all those non-agricultural activities which produce income to rural households either through waged work or in self-employment.

Rural off-farm income activities is an important source of local economic growth examples which are quarry, mining, timber processing and local fabrication (Benjamin and Richard, 2019). Meanwhile, Ovwigho (2014) reported that off-farm is of great importance to the rural economy because of its production linkages and employment effects, while the income it provides to rural households represents an important and sometimes increasing share of rural incomes. Often this share is particularly high for the rural poor and there is evidence from the work of Yakubu *et al.* (2015) who posited that the contributions of off-farm income are becoming increasingly significant for food security, poverty alleviation and farm sector competitiveness and productivity.

2.2.2 Overview of off-farm income activities

Off-farm income obtained through off-farm activities has become an important livelihood strategy for the rural farming household in most developing countries including Nigeria (Babatunde *et al.*, 2010). Declining farm income among rural farming household and the urge to insure against risks associated with agricultural production and market necessitate the participation in off-farm activities among rural farmers in Nigeria. When returns to off-farm employment become higher and less risky than on-farm employment, farm households would be pulled into off-farm work.

Both scenarios of distress-push and demand-pull diversification have been recognized by researchers. Van den Berg and Kumbi (2006) posited that distress-push effects were dominant, citing shrinking per capita land availability as the major reason for increasing off-farm activities. Babatunde *et al.* (2010), in contrast, held that land was not the most limiting factor. Off-farm income had been found to contribute significantly to total household income (Bjornsen and Mishra, 2012) indicating complementary relationship existed between farm income and off-farm income.

According to Winters *et al.* (2009), the traditional image of farm households in developing countries has been that they focused almost exclusively on farming and undertook little of off-farm activities. This image was persisted and widespread. Policy debate still tended to equate farm income with rural incomes, and rural-urban relations with farm-non-farm relations. There has been a tendency even among agriculturists and those interested in rural development to neglect the rural non-farm sector. However, there is strong evidence from the work of Yakubu *et al.* (2015) that off-farm income is an important resource for rural households including the landless poor.

According to Bjornsen and Mishra (2012), there are four basic reasons why the promotion of off-farm activity could be of great interest to developing country policy-makers. First, available evidence showed that off-farm income is an important factor in household economies and food security, since it allowed for greater access to food. This source of income might also prevent rapid or excessive urbanization as well as natural resource degradation through over-exploitation. Second, in the face of credit constraints, off-farm activity affects the performance of agriculture by providing farmers with cash to invest in productivity-enhancing inputs.

Third is the development of off-farm activity in the food system (including agro-processing, distribution and the provision of farm inputs) might increase the profitability of farming by increasing the availability of inputs and improving access to market outlets. In turn, better performance of the food system would increase rural incomes and lower urban food prices. Fourth, the nature and performance of agriculture, affected by agricultural policies, could have important effects on the dynamism of the off-farm sector to the extent that the latter is linked to agriculture.

Tocco *et al.* (2012) asserts that analyses of off-farm labour supply included proxies for personal and household characteristics to estimate structural farm household models in a reduced methodology. Larger farm household might be more likely to rely on off-farm income because the family could operate the farm as well as have one or more family members left to work off-farm. This could be induced by higher living expenses associated with large household size. Study by Benjamin and Kimhi (2006) have found negative relationship between farm size and off-farm. Farming households operating larger farms might be less likely to seek off-farm income as the time required to operate large farms could be enormous.

2.2.3 Concept of livelihood

According to Chambers and Conway (1992), livelihood is a means of securing a living. Livelihood meaning can often appear elusive due to vagueness or different definitions being encountered in different sources. Ellis (2010) stated that livelihood is a means of securing the necessities of life which makes it more than merely synonymous with income because it directs attention to the way in which a living is obtained, not just the net results in terms of income received or consumption attained. A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living (Ajayi *et al.*, 2016).

The above definitions has been utilized by several researchers (Babatunde and Qaim, 2009; Assan and Beyene, 2013; Ajayi *et al.*, 2016) adopting the rural livelihood strategy approach. It should be kept in view that an important feature of this livelihood definition is intended to draw attention to the links between assets people possess in practice to pursue alternative activities that can generate the income level needed for survival. Ajayi *et al.* (2016) describe livelihood as a material means wherein individuals make a living and livelihood strategies/income diversification refers to the bundle of activities that people undertake to provide for their basic needs (or surpass them).

According to United States Agency for International Development (USAID), livelihood is the sum of ways in which household make ends meet from year to year and how they survive or fail through difficult times (USAID, 2015). Onakuse and Eamon (2008) perceived livelihood to comprise the capabilities, assets and activities required for a means of living. The concept of livelihoods is dynamic, bearing in mind that people's livelihoods condition changes sometime rapidly overtime (Drinkwater, 1998). In the light of this discussion, the following definition as proposed by the authors describes the meaning of the term livelihood. A livelihood encompasses the assets (natural, physical, human, financial and social capital), the activities and the access to these assets (mediated by institutions and social relations) which together determine the living standard of an individual or household or a community.

Meanwhile, a livelihood strategy can be defined as an activity or a set of activities in which a household engages to make a living which could be in agriculture, non-agriculture or both sectors. Both economic and other set of factors constitute critical decision parameters that shape activity choices of households. Assets, skills, incomes or generally, endowments are as important as social class and caste, opportunities, family

networks, ethnicity, institutional and political regimes governing access to opportunities, social capital, and household's perception of risk in determining which activities households participate in (Akinwale, 2010; Barret *et al.,* 2010).

Sharma (2010) stated that livelihood strategy (making a living) is largely about generating income. But this is really a means to an end, which also includes aspects of food security (the ability to feed oneself and one's family), providing a home, health, security (reduced vulnerability to climatic, economic or political shocks, and so forth), sustainability (the ability to continue to make a satisfactory living), power (the ability to control one's own destiny) and others. Sisay (2013) reported that livelihood strategies drive at the method for securing the fundamental necessities (nourishment, water, haven and garments) of life. Livelihood Strategies are diverse at every level as reported by Brown *et al.*(2006) that several methods of characterizing household livelihood strategies can be found in the literature. Most commonly, economists group households by shares of income earned in different sectors of the rural economy.

2.2.4 Conceptual model

Conceptual model is a confirmed idea about a phenomenon. The model is categorized into dependent, independent, intervening and expected outcome. Figure 2.1 shows the conceptual framework of off-farm activities on the livelihood status of the small-scale farmers in Niger State, Nigeria. The basic assumptions in the study are that farmer socio-economic characteristics, institutional variables, off-farm income activities and associated constraints will play a significant role in influencing the livelihood status of the small-scale farmers which lead to expected change in the output, income, livelihood and economy of the farmers as well as the transformation of the rural economy in general. It is also based on the premise that the livelihood status of the small-scale farmers will be influence by certain exogenous factors (intervening variables) such as government

programmes and policies, seasonality of agriculture, climatic condition (weather condition, rainfall pattern), and cultural beliefs of the people leading to an increased output, income and improved living standard.

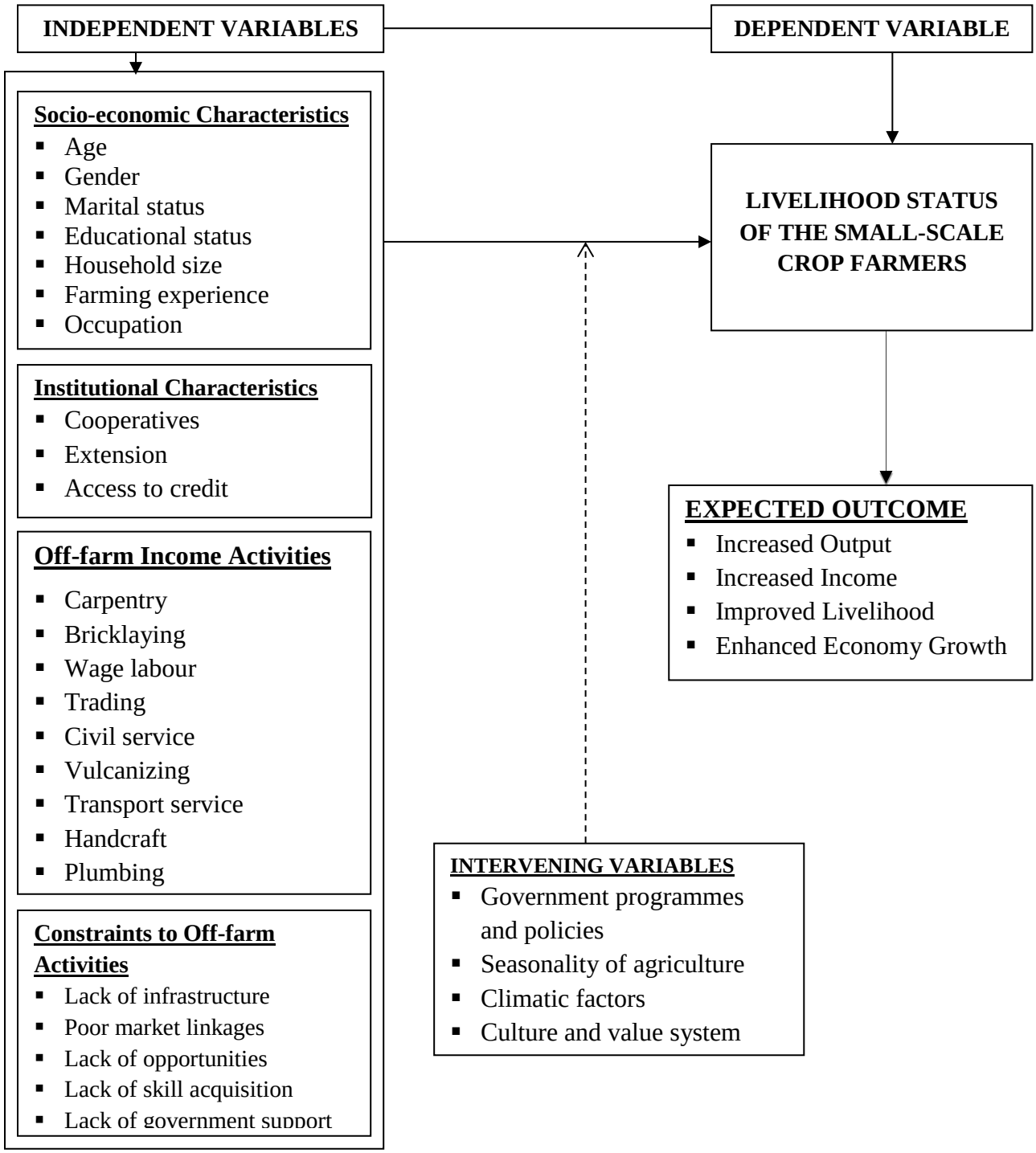

Figure 2.1: Conceptual framework on the effect of off-farm income diversification on livelihood status
Source: Adopted and Modified from Oyediran (2016)

2.3 Analytical Framework

The nature and purpose of a study determines the type of analysis and analytical techniques to be employed, therefore each research work has an appropriate approach, though general principles apply. Also, the choice of techniques depends on a host of factors, in particular, the objectives of the study, the availability of data, time and budget. Different approaches could be used to analyze data. The first step of simple but important analytical tool used in data analysis is the descriptive statistical tools involving mean, percentages, standard deviation and frequency distribution among others. In addition to the descriptive statistical tools, some specific objectives and quantitative data require in-depth analysis which may need more complex analytical tools than the simple descriptive statistical tools. However, for this study, inferential statistical tools such as Poisson and Tobit regression analysis will be employed.

2.3.1 Regression analysis

Regression analysis aims to establish and/or prove how one variable is related to another, that is, the amount of change in the value of another variable which derives from a unit change in the value of another variable. It is based on the statement of a causal or functional relationship between variables. In statistics, regression analysis is a technique which examines the relation of a dependent variable (response variable) to specified independent variables (explanatory variables). This can be used as a descriptive method of data analysis (such as curve fitting) without relying on any assumptions about underlying processes generating the data (Oyediran, 2016).

The key relationship in a regression is the *regression equation*. This contains regression parameters whose values are estimated using data. When a regression model is used, the dependent variable is modeled as a random variable because of either uncertainty as its

value, or inherent variability. The data is assumed to be a normal distribution (Oyediran, 2016). The parameters of a regression model can be estimated in many ways, some of which are:

- Least Squares Estimation (LSE) and
- Maximum Likelihood Estimation (MLE)

Real-life phenomenon involves interaction between more than two variables. Therefore, where there are more than two variables, the analysis is called multivariate analysis. A few commonly used multivariate analysis techniques for illustrative discussion are:

- Multiple Regression
- Models of qualitative choice (Probit, Logit and Tobit)

2.3.2 Assumption of OLS regression model

Regression analysis depends on certain assumptions:

i. The predictors must be linearly independent, i.e, it must not be possible to express any predictor as a linear combination of the others.
ii. The error terms must be normally distributed and independent; and
iii. The variance of the error terms must be constant.

Regression analysis can predict a given factor (value of dependent variable) based on the interactions of other factors (predetermined values of explanatory variables). For example, it allows us to predict sales volume, using the amount spent on advertising and the number of sales personnel. In order to carry out multiple regression analysis, researchers use a variety of modern statistical methods, econometric models and analytical software (computer programmes).

2.4 Empirical Review

2.4.1 Socio-economic characteristics of small-scale crop farmers

Socio-economic characteristics play significant role in the farmers' lives in the sense that they influence ability to accept changes which contributed significantly in raising farm productivity and ultimately their livelihood (Muhammed, 2015). Some of the most commonly used socio-economic variables includes age, sex, marital status, level of education, household size, farm size, farming experience, land acquisition, labour, access to credit, membership of cooperative, extension contact and other estimated economic variables like income, output and standard of living.

Benjamin and Richard (2019) in their study determinants of off-farm income among smallholder rice farmers in Northern Ghana: application of a double-hurdle model reported that most of the respondents in their study area were male (78%). The average age of the respondents was 41.2 years, while household size averaged 10 members. The respondents had 4 years of formal education and travelled an average of 8 km to the nearest market. Forty-three percent (43%) participated in off-farm work. Total income from off-farm work averaged 1,111 Ghana Cedis (GH¢) (approximately $232) per annum. On average, respondents had 21years off-farm experience and allocated 45% of total land to rice cultivation (a measure of the degree of specialization in rice production). In addition, 33% of the respondents were located in the Northern Region while 40% used credit in farming.

Asfaw *et al.* (2017) in their study determinants of non-farm livelihood diversification: evidence from rainfed-dependent smallholder farmers in North Central Ethiopia reported that among the surveyed households, 35.7% had income from non-farm economic activities; the proportion of male-headed households engaged in non-farm activities (37.5%) seems higher than female-headed ones (24.5%). The average age was found to

be 48.93years which indicates that the majority are in their productive age level. The family size of the study area was relatively large with a mean of 6 people. The average year of schooling was found to be 2.92 years and this implies most of the farmers did not even complete primary level. Around 31% of the respondents indicated a serious shortage of land for cultivation. More so, Ayantoye *et al.* (2017) in their study determinants of livelihood diversification among rural households in Kwara State, Nigeria reported that the mean age of the respondents was 39.36 years and 66.4% of the respondents were married. Most (66.7%) of the respondents had a household size of 1– 5 with mean household size of 5 people.

Ajayi *et al.* (2016) in their study livelihood diversification of rural households in Niger State, Nigeria reported that majority (74.6%) of the respondents were within the age range of 21 – 50 years with a mean age of 44 years;77.2% of the respondents were male, while 22.8% were female implying that men are more involved in livelihood diversification than the female. Majority (72.9%) of the respondents attained one form of formal education or the other with 27.1% having no formal education. The mean years spent in formal education was seven (7) years implying that most of the respondents did not had higher educational attainment that could enhance their livelihoods diversification, while mean household size was 9 persons implying larger household size and a better chance of livelihood diversification. The mean farming experience was 29 years implying that the respondents were experienced farmers and mean farm size of 2 hectares implying that the respondents are small-scale farmers.

Nse-Nelson *et al.* (2016) in their study income diversification for reducing rural poverty among farm households in Umuahia North Local Government Area of Abia State, Nigeria reported that majority (63.3%) of the respondents in the study area were at their mid-age of about 41 – 50 implying greater involvement in both on-farm and off-farm activities.

Majority (84.4%) of the farmers were married, while 15.6% were single and about 65.6% of the respondents were females, while 34.4% were males. They also observed that 65.4% of the respondents had household size between 1 to 5 and 34.4% had a household size between 5 and 10 which is a good indicator for more income generating activities for sustainable livelihood. Majority of the respondents (52.2%) had farm size of 1.0 – 1.9 implying that they had small farm size.

Sallawu *et al.* (2016) in their study livelihood and income diversification strategies among rural farm households in Niger State, Nigeria revealed that the average age of the respondents was 42 years. Most of the respondents are within the age range of 30-49 years and accounted for 69%, while only a few of those surveyed are either too young or too old to engage in one activity or the other in the study. Majority of the respondents were male representing 95.50% and had family sizes ranging from 1-10 which accounted for 79.5%, and only 20.4% of the respondents had over 10 persons per household. Most of the respondents had 21-30 years of farming experience accounting for 40.4%, with an average of 26 years of experience, while 55.80% of the respondents had farm sizes ranging between 0.5-4.0 hectares, and a typical respondent had 2.82 hectares.

Yakubu *et al.* (2015) in their study off-farm activities and its contribution to household income in Hawul Local Government Area, Borno State, Nigeria revealed that more than half (63.70%) of the household members were female. Thus, engaged in off-farm activities to supplement their household income. More so, 59.25% of the respondents are within the age of 26 – 35years; 62.96% of the households were married and 54.10% had between 21 – 40 years of farming experience. Annual income shows that 56.30% of the households had monthly off-farm income between ₦11,000 – ₦20,000, while 42.96% were cultivating farmland of less than one hectare.

2.4.2 Rural household income

According to International Labour Organization (2003) "household income consists of all receipts whether monetary or in kind (goods and services) that are received by the household or by individual members of the household at annual or more frequent intervals, but excludes other irregular and typically one time receipts. Household income receipts are available for current consumption and do not reduce the net worth of the household through a reduction of its cash, the disposal of its other financial or non-financial assets or an increase in its liabilities". Rural households in the developing world are involved in a variety of economic activities, as part of complex livelihood strategies.

Agriculture, while remaining important, is not the sole nor, in some cases, necessarily the principal activity of the poor. Olawepo (2010) stated that the majority of the rural populace in Nigeria either depends entirely on farming and farming activities for survival and generation of income, or depends on these activities to supplement their main sources of income. However, Adedayo (2005) suggested that the income levels of rural communities may be attributed to certain crucial factors, and understanding these factors may hold the key to effective rural development policy making.

In another study, Olatona (2007) stated that a closer look at the determinants of rural income provides an in-depth knowledge into the factors that explain low income, yields and poverty in rural regions where these rural farmers constitute about 90% of the total population. Olayemi (2011) posited that income diversification is the norm among rural households, and different income generating activities over alternative pathways out of poverty for households as well as a mechanism for managing risk in an uncertain environment. It is therefore useful, when thinking about rural development, to think of the full range of rural income generating activities, both agricultural and non-agricultural, carried out by rural households. This can allow a better understanding of the relationship

between the various economic activities that take place in the rural space and their implications for economic growth and poverty reduction (Davis *et al*., 2010).

Agricultural production remains an important source of income for most of those living in rural areas and its growth will continue to be a mainstay of poverty alleviation but most farms are small size. Anríquez and Bonomi (2007) estimated that, roughly 9 of 10 farms in the developing world are smaller than 2 hectares. Measuring of household well-being is considered one of the key reasons for collecting income data which can be utilize for the analysis of welfare, livelihood and poverty, to check the accuracy of consumption data, to estimate household savings, and to assess the relative importance of the various activities that contribute to total household income (McKay, 2010).

An income aggregate is a measure of household welfare that is based on the different sources of income wage and non-wage, dependent and independent that a given household can earn over a well-defined reference period set up as a monthly or annual indicator, the income aggregate is reported as an average net income figure. Wage income includes all activities undertaken by persons in which the income received is in the form of a salary paid out by an employer; in other words, wage income includes earnings from dependent activities. Non-wage income is a broader category referring to; independent income, which includes crop and livestock production and self-employment (enterprise) earnings, and the other category is non-labour income, containing transfer and other miscellaneous income sources (Aksoy *et al*., 2009).

2.4.3 Off-farm livelihood diversification of the rural farmers

The following empirical studies were conducted to assess livelihood diversification via off-farm activities around the world. Kijima *et al.* (2006) analyzed the role of off-farm employment in poverty reduction using panel data from894 rural Ugandan households in

2003 and 2005. Taking advantage of the unique off-farm labor supply and income data, they found out how households respond to negative agricultural shocks, especially through off-farm labour supply and income to mitigate crop income loss.

Asmah (2011) examined how some selected proxies of the agricultural sector reforms in Ghana changed over time and evaluated their relative importance in influencing rural livelihood diversification and household welfare. In doing this, data were pooled from the 1991/1992 and 2005/2006 Ghana Living Standards Survey and the endogenous switching regression technique was employed. The results showed that diversified households and less diversified households differed significantly in terms of variables related to household assets, markets and institutions. Both household welfare and rural non-farm diversification decisions are mostly driven by household assets including good health, education and household age composition.

Oluwatayo (2009) studied the determinants of diversification using a Tobit model. Data were collected from 420 households selected from six states, Nigeria. The result of the Tobit regression model showed that the coefficients of gender, household size, poverty status and access to credit facility were positive. This indicates that any increase in the value of the coefficients of these variables has a higher likelihood of influencing the estimated livelihood diversification index positively. Further, the coefficients of years of formal education, income, marital status, primary occupation and location were negative. Thus, an increase in the value of any of the variables will negatively influence the estimated livelihood diversification index. In general, male-headed, small-sized, non-poor households with formal education and better income and access to credit facility were not engaged in multiple jobs like female-headed, uneducated, large-sized, poor households and those not having access to credit facility.

De-Janvry *et al.* (2005) used detailed household survey data from Hubei province in China to simulate the counter-factual of what rural households' incomes, poverty and inequality would be in the absence of access to off-farm sources of income. Results show that, without off-farm employment, rural poverty would be much higher and deeper, and that income inequality would be higher as well. They find that education, proximity to town, neighborhood effects and village effects are crucial in helping particular households gain access to these opportunities. They also find that those who stay as pure farmers have non-observable characteristics that make them much more productive in agriculture, implying positive selection on these characteristics. Moreover, participation in non-farm activities has a positive spillover effect on household farm production.

Sisay (2013) analyzed off-farm activities and income among 1343 households in rural Ethiopia using a panel data set. Key findings observed that non-poor households generate a significant amount of income from farming activities; the non-poor participate more in high earning off-farm activities while, on average, the poor participate in low-earning off-farm activity; poor households participate due to the push factor while the non-poor participate as a choice; households with more resources get better off-farm earnings; the share of off-farm income is higher for poor households, that is, off-farm income constitutes nearly 35% and 18% of household income for poor and non-poor households, respectively. In general, the finding indicates that the poorer segment of society relies relatively more on off-farm income and there is an entry barrier for poor households to participate on high-earning activities. Therefore, the study concluded that off-farm activities have a potential to reduce poverty and income inequality as it is relatively beneficial to poorer households.

Beyene (2008), studies in Chile and Nicaragua indicate that poor society could not allocate labour and resources into off-farm activities because of a lower level of asset. It

was found out that a decrease in availability of arable land, an increase in producer/consumer ratio, credit delinquency and environmental deterioration can be important drivers towards off-farm diversification. However, Olugbire *et al*. (2011) investigated the impact of off-farm employment (disaggregated by wage and self-employment) on household income and poverty in Nigeria using a propensity score matching model, they evaluated the differences in outcomes between households who participate in the off-farm activities and those who do not. The results from the study showed that off-farm wage-employed households have a significantly higher income than self-employed households. Findings also revealed that off-farm wage-employment impacts more on household welfare than on-farm self-employment. The benefits to off-farm wage-employment are much higher among the non-poor than among the poor.

Awoniyi and Salman (2011) investigated the level of off-farm income diversification, its effect on welfare status of farming households and factors that determine levels of off-farm income diversification using fuzzy set and Logit regression analysis. The result of the analysis revealed that the factors that determine participation in non-farming activities are age of the household head, being male, having formal education, household poverty status and farm size. The result of the poverty analysis indicates that a larger percentage (53.9%) of farming households whose household heads are not engaged in off-farming activities live below the poverty line compared with farming households (48.3%) whose household head is engaged in off-farming activities. The study concludes that farming households that are not involved in non-farming activities are more vulnerable to poverty when compared with farming households that engaged in nonfarm income.

2.4.4 Effect of off-farm income activities on small-scale crop farmers' livelihood

Farming households faced large variations in farm income due to weather and price shocks (Kwon, 2006). In order to mitigate the effects of these fluctuations, or lessen

exposure to such risks, farm households often adopted such principles as future market, forward contracts, or insurance market. Unfortunately, these approaches were not within the reach of small-scale farmers in rural areas of developing countries. Kwon (2006) were also of the view that government intervention in farm gate prices through price supports or loan deficiency payments could moderate the magnitude of the fluctuations. However, the efficiency of government interventions, supports and credit supplies in Nigeria leaves so much to be desired. Hence, variability in farm-level net income and capital has persisted with attendant consequences. The foregoing incidence has given rise to an increased pressure on farming household to diversify their means of livelihood away from farming.

Similarly, Mishra and Sandretto (2011) found that off-farm income minimized total variability in farming household income. Marginal propensity to consume out of off-farm income is larger than the propensity to consume out of farm income. This is in line with the vital role played by off-farm income as a short-term supplement to farm income which will in turn lead to re-investment and expansion of farm capital base among rural farming household. Thus, off-farm diversification afforded rural farming households the following range of benefits: increased revenue, adaptability, food and income security, sustenance in valued farming tradition, and development of new skills that would facilitate the expansion of business networks (Adepoju and Oyewole, 2014).

The effect of off-farm activities on overall income inequality could be analyzed through the relationship between off-farm income, on the one hand, and farm income on the other(Babatunde*et al.*, 2010). The implicit view was often that the two moved in opposite directions, so that off-farm and farm incomes essentially offset each other. In other words, smaller farms have higher off-farm incomes than large farms, or at least the share of off-farm income in total income declined as total household income increased. According to

Babatunde *et al.* (2010), rural off-farm activities did not necessarily improve rural income distribution. In reality, however, evidence regarding the relationship between the share of off-farm income in total household income and the level of total income and or the size of landholdings was very mixed.

In the selection of different patterns of relationships between off-farm income shares and total household income or landholdings, the selection tended to be representative of the spectrum of patterns found in the different regions. At one extreme, there was evidence of a strong negative and linear relationship between the off-farm share in income and total household income. At the other extreme, however, there were cases of a strong positive and linear relationship (Reardon and Vosti, 2006). Meanwhile, low-asset households could spend a large share of their time in off-farm activities, but the wage (hence, the level of off-farm income) they could receive will be low.

Conversely, higher-income households might spend the same or a lower share of their resources in off-farm activities but earn much higher returns per unit of resources invested (Loison, 2015). Activities that were intensive in skilled labour and or physical capital (e.g. cottage manufacturing, transport requiring the use of a vehicle, shop commerce and salaried jobs) had the highest labour returns, as expected, and were undertaken by the wealthiest household strata. The poor (i.e. those with limited assets and/or skills) tended to undertake activities that were intensive in unskilled labour (such as farm wage labour, market porter jobs, wood gathering and unskilled factory jobs).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The study was conducted in Niger State which is one of the six states in the North-Central Nigeria. It is located within latitudes 8° 20′ and 11° 30′ North and longitudes 8° 30′ and 8° 20′ East, and covers 76,363 square kilometers of land mass which makes it the largest Nigerian State by land mass. The State has a population of 3,950,249 (National Population Commission (NPC), 2006). However, using the population growth rate of 3.2%, the projected population of the State was 5,764,755 as the end of 2018. The landscape consists mostly of wooded savannas and includes the flood plains of the Kaduna River.

Niger State as one of the North-Central States in Nigeria experience two main weather conditions (dry and wet seasons); with annual rainfall varying from 1,100mm in the Northern part to 1,600mm in the Southern parts. The State has a maximum temperature of not more than 34°C which is recorded between March and June every year with some slight variations and the minimum is usually between December and January. The largest ethnic group in Niger State is the Nupes. Other major ethnics residing in the State include, the Gwari in the East, the Busa in the West, and Kamberi, Hausa, Fulani, Kamuku, and Dakarki in the North (Niger State Agricultural Mechanization and Development Authority (NAMDA), 2018).

The fertile soil type and hydrology of the state permit the cultivation of variety of cash and food crops and still allows sufficient opportunities for grazing, fresh water fishing and forestry development. The state has a predominant farming population who mostly resides in the rural areas. Some of their dominant harvests include Cotton, Shea nuts,

yams, and peanuts (groundnuts) which are for subsistence and commercial purposes (NAMDA, 2018).

Paddy rice is mostly cultivated as cash crop in the floodplains of the state and Kaduna Rivers, especially in the area around Bida. Cattle, goats, sheep, chickens, and guinea fowl are reared for meat. Pottery, brass work, glass manufactures, raffia articles, and locally dyed cloth are significant exports in the state. Marble is quarried at Kwakuti, near Minna, the state capital and Minna has a brick-making factory. Niger state is a home for major hydro-electric power dams. These are Shiroro, Jebba and Kainji Dams. These dams serve dual purposes - generating hydroelectric power and sustain irrigation projects. The map of the study area is thereby presented as in Figure 3.1.

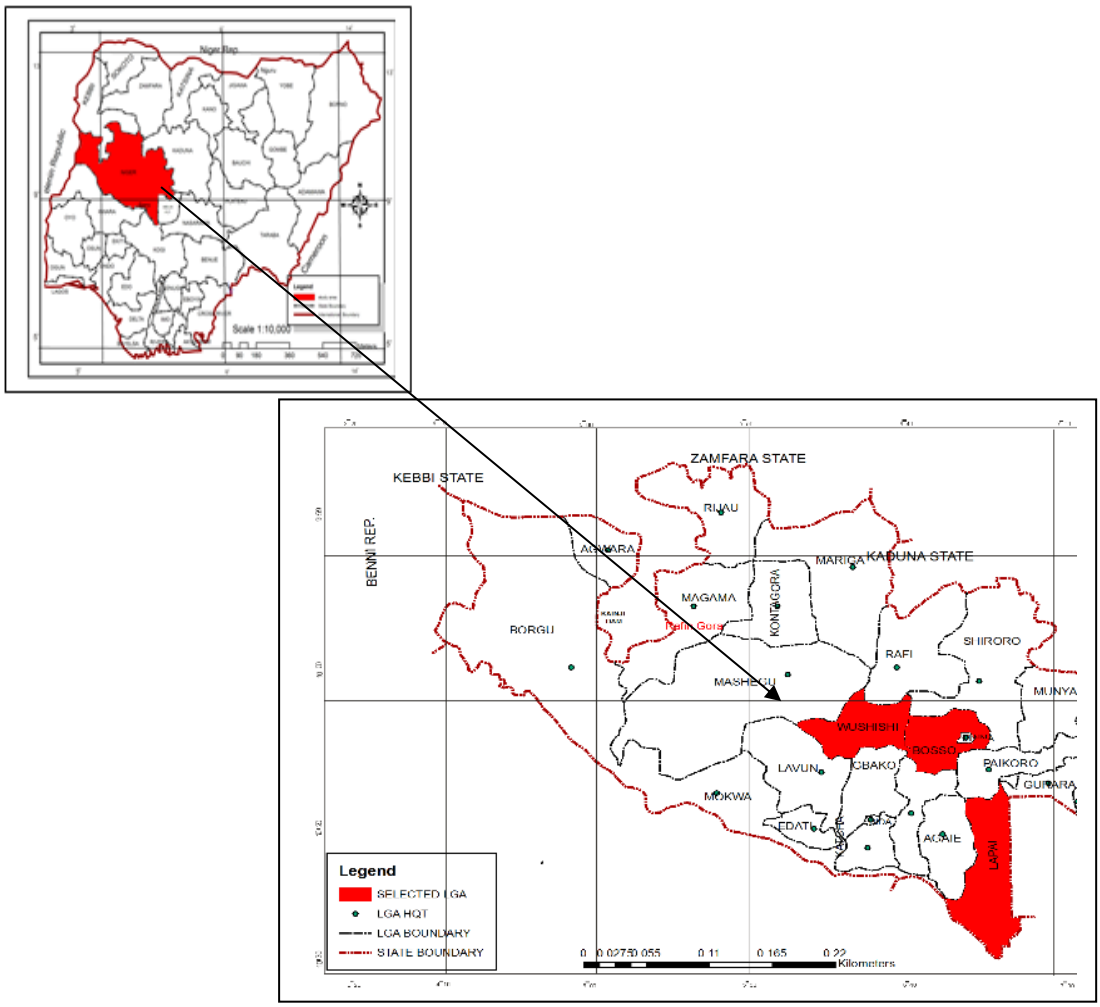

Figure 3.1: Map of Nigeria showing Niger State as well as Map of Niger State showing the selected Local Government Areas.

Source: Niger State Geographical Information System (NSGIS), 2018

3.2 Sampling Procedures and Sample Size

The population for this study comprised of small-scale crop farmers in Niger State, Nigeria. A multi–stage random sampling procedure was used to select the respondents. The first stage was random selection of one Local Government Area (LGA) from each of the agricultural zones (Lapai LGA from zone I out of 8 LGAs, Bosso LGA from zone II out of 9 LGAs and Wushishi LGA from zone III out of 8 LGAs). In the second stage, three villages were randomly selected from each of the LGA selected to give a total of nine villages. The third stage involved proportionate sampling of the small-scale crop farmers using Yamane's formula from each of the selected village's based on the sample

frame obtained from Niger State Agricultural Mechanization and Development Authority (NAMDA) to get a total of 241 small-scale farmers that were used as respondents for the study. A summary of the selection procedure is presented in Table 3.1. The Yamane (1967) formula is given as in equation (9):

$$n = \frac{N}{1+N(e)^2} \qquad (9)$$

Where;

n = sample size

N = finite population

e = error limit (precision level of 0.06 level of significance)

1 = constant

Table 3.1: Distribution of Respondents in the Study Area

Agricultural Zones	LGA	Villages	Sample Frame	Sample Size
I	Lapai	Arewa/Yamma	279	37
		Ebbo	209	27
		Evuti	201	27
II	Bosso	Garatu	115	15
		Beji	145	19
		Sabon-Dagali	281	37
III	Wushishi	Zungeru	195	26
		Madagi	221	29
		Maito	178	24
Total	**3**	**9**	**1824**	**241**

Source: Niger State Agric. Mechanization and Development Authority (NAMDA), 2018

3.3 Method of Data Collection

Primary data were used for this study which was collected with the aid of structured questionnaire complemented with an interview schedule. The information was collected on farmers socio-economic characteristics such as age, household size, educational status, amount of credit received, numbers of extension contact, years spent on the cooperative

and income; off-farm income activities of the small-scale farmers, information of livelihood status as well as constraints mitigating small-scale farmers to diversify. Well trained enumerators assisted the researcher in the data collection.

3.3.1 Validity and reliability of instrument

Content and face validity test were used to determine the adequacy and relevance of the instrument. In the process, the instrument was thoroughly examined by appropriate experts independently. The experts are gave their critical opinions on the adequacy and relevance of the instrument to the objectives and hypotheses for the study. The observations were harmonized and necessary corrections effected on the instrument before the field survey commences.

Meanwhile, Cronbach alpha method was used to ascertain the reliability coefficient index of the instrument. In this regard, 30 copies of the research instrument were administered to the respondents once and the data collected were analyzed to obtain 0.75 reliability coefficient. The study therefore adopted the 0.75 as the minimum threshold for accepting the consistency of the instrument as used by Pallant (2015).

3.4 Method of Data Analysis

The data collected were analyzed using descriptive and inferential statistics. Objectives i, ii and vi were achieved using descriptive statistics such as mean, standard deviation, percentages and frequency distribution. Objective iii was achieved using Multivariate probit regression analysis. Objective iv was achieved using Livelihood index and Objective v was achieved using Tobit regression analysis. The hypothesis i of the study was achieved using t-value from the Tobit regression and hypothesis ii was achieved using Peason's product moment correlation.

3.5 Model Specification

3.5.1 Descriptive statistics

Descriptive statistics which involved the use of measure of central tendency such as mean, frequency distribution, coefficient of variation and percentages were used to achieve objective which is to describe the socio-economic characteristics of the small-scale farmers, objective ii which is to identify the off-farm income activities and objective vi which is to examine the constraints faced by the respondents to diversify into off-farm income activities in the of the study.

3.5.2 Multivariate probit regression model

Multivariate probit regression model is a generalization of the probit model used to estimate several correlated binary outcomes jointly. Multivariate probit regression model as used by Johnson and Wichern (2007) is a method for modelling multiple responses (or dependent variables) with a single set of predictor variables. Thus, Y takes dichotomous values of one if respondents engage in a given off-farm income diversification or zero if otherwise based on the total number of options. Multivariate regression analysis was used to achieve objective iii which is to determine the factors influencing off-farm income activities diversification by the small-scale farmers in the study area. The Multivariate regression model approximates the mathematical relationships between the explanatory variables and dependent variable which is built around a latent regression given as in equation (10):

$$Y^* = x'\beta + \varepsilon \quad (10)$$

Where Y* is the unobserved latent variable as shown below, ε is the error term of the estimation, β is the coefficient of the unknown threshold parameters that determine the estimations for different observed value of Y ranging from 1, 2, ……11 off-farm income diversification options.

Y_1 = Marketing/Trading (measured as 1 if engaged, 0 if otherwise)

Y_2 = Tailoring (measured as 1 if engaged, 0 if otherwise)

Y_3 = Plumbing (measured as 1 if engaged, 0 if otherwise)

Y_4 = Carpentry (measured as 1 if engaged, 0 if otherwise)

Y_5 = Civil Service (measured as 1 if engaged, 0 if otherwise)

Y_6 = Weaving/Knitting (measured as 1 if engaged, 0 if otherwise)

Y_7 = Bricklaying (measured as 1 if engaged, 0 if otherwise)

Y_8 = Handcraftsmanship (measured as 1 if engaged, 0 if otherwise)

Y_9 = Electric/Mechanic repairs (measured as 1 if engaged, 0 if otherwise)

Y_{10} = Sales of local herbs (measured as 1 if engaged, 0 if otherwise)

Y_{11} = Transportation services (measured as 1 if engaged, 0 if otherwise)

The explicit form of the model could be expressed as given in equation (11):

$$Y_j = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \ldots\ldots\ldots\ldots + \beta_{10} X_{10} + e \qquad (11)$$

Y_j= Off-farm income diversification engaged by the small-scale crop farmers (This was measured as dichotomous variables taking the value of 1 when the farmer chooses an off-farm income option and 0 if otherwise).

$_j$ = number of off-farm income diversification options taking the value of 1, 2, 3, …..11.

X_1 = Age (years)

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

X_3 = Sex (male = 1, female = 0)

X_4 = Household size (number)

X_5 = Farming experience(years)

X_6 = Education(years)

X_7 = Income(naira)

X_8 = Output (kilogram)

X_9 = Livelihood status (livelihood index)

X_{10} = Skill acquisition (number)

β_o = constant

e = error term

$\beta_1 - \beta_{10}$ = coefficients of the independent variables

$X_1 - X_{10}$ = independent variables

3.5.3 Livelihood index model

Livelihood indicators among the respondents as used in this study include household assets, livestock assets and production assets.

i. Household assets: This include ownership of land properties, furniture, houses, cars, bicycle, motorcycle, radio and television among others measured as dummy variable (i.e 1 if owned, 0 if otherwise).
ii. Livestock assets: This include ownership of cow, sheep, goat, dogs, chicken, horses and donkeys among others measured as dummy variable (i.e 1 if owned, 0 if otherwise).
iii. Production assets: This includes ownership hoes, cutlasses, matchet, plough, ridger, water pump, ox-cart, milling and grinding machines among others measured as dummy variable (i.e 1 if owned, 0 if otherwise).

Livelihood status of the respondents was measured using livelihood index as used by Olughu (2019). The index is expressed as in equation (12);

$$LI = \frac{\text{Number of off-farm livelihood diversification owned by the respondents}}{\text{Total number of off-farm livelihood diversification indicators}} \quad (12)$$

Where;

LI = Livelihood Index

Meanwhile, the LI was categorized further by the researchers follows:

0.01 – 0.26 = low livelihood status

0.26 – 0.50 = moderate livelihood status

0.51 – 0.75 = high livelihood status

0.76 – 1.00= very high livelihood status

3.5.4 Tobit regression model

Tobit Regression model was used to determine factors influencing livelihood of the small-scale rice farmers in the study area which is the objective (v). The Tobit model as proposed by Greene (2003) and adopted by Ajayi *et al.* (2020) could be explicitly expressed as in equation (13):

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots\ldots\ldots\ldots\ldots + \beta_{12} X_{12} + U \quad (13)$$

Where;

Y = Livelihood status of the small-scale crop farmers measured using LI

X_1 =Age of farmers (years).

X_2 = Sex (1 if male, 0 if otherwise)

X_3 = Household size (number)

X_4 = Education (years)

X_5 = Farming experience (years)

X_6 = Farm size (ha)

X_7 = Access to inputs (access = 1, 0 if otherwise)

X_8 = Access to credit (access = 1, 0 if otherwise)

X_9 = Extension (contact = 1, 0 if otherwise)

X_{10} = Membership in farmer's organization (number)

X_{11} = Off-farm income (Naira)

U = Error term

β_0 = Constant term

β_1–β_{11} =Regression coefficient

3.5.5 Pearson's product moment correlation (PPMC)

Pearson product moment correlation (PPMC) was used to test for the hypothesis ii which stated that there is no significant relationship between the off-farm income diversification of the small-scale crop farmers and their livelihood status in the study area. The model is specified as in equation (14):

$$r_{xy} = \frac{n\sum xy - (\sum x)(\sum y)}{\sqrt{\{n\sum x^2 - (\sum x)^2\}\{n\sum y^2 - (\sum y)^2\}}} \quad (14)$$

r = correlation coefficient

x = independent variables (off-farm income diversification)

y = dependent variable (livelihood status)

n = total number of observation

Σ = summation

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Socio-Economic Characteristic of Small-Scale Farmers

The socioeconomic characteristics of the farmers under consideration include; age, marital status, educational status household size, years of farming experience, farm size etc.

4.1.1 Age

Results in Table 4.1 indicated that (36.5%) and (29.5%) of the respondents had age of 26-35 years and 36-45 years respectively. The mean age of the respondents was 37.6 years, implying an active and productive age where small scale farmers diversify into off-farm income generating activities in order to improve their livelihood. This finding is in agreement with that Nwaru and Ekumankama (2012) who reported mean age of 49 years for households that diversified in South East of Nigeria. Odoh and Nwibo (2017) confirmed that majority of household Southeast Nigeria that diversified into non-farm income are younger and active in their respective occupations.

4.1.2 Sex

The results in Table 4.1indicated that 68.9% of the respondents in the study area were males while 31.1% were females. This implies that most of the respondents were male. Male dominance might due to the fact that they are the major decision makers regard to off-farm income generating activities in the study area. This finding is in agreement with that of Odoh and Nwibo (2017) who larger proportion of households that engaged in off-farm activities in South-East of Nigeria were male.

4.1.3 Marital status

The result of marital status as presented in Table 4.1 showed that 83.4% of the respondents were married while 10.4%, 4.6% and 1.7% were single and widowed and divorced respectively. This shows that majority of the respondents in the study area were married. Marriage involves high responsibilities on the family thereby forcing households to diversify into off-farm income generation for improving livelihood and also to assist their families. This finding concurs with Adeoye *et al.* (2019) who reported that majority of rural households in Nigeria are married.

Table 4.1: Distribution of respondents based on socioeconomic characteristics (n=241)

Variables	Frequency	Percentage	Mean
Age			
< 26	30	12.4	37.6
26 – 35	88	36.5	
36 – 45	71	29.5	
46 – 55	38	15.8	
> 55	14	5.8	
Sex			
Male	166	68.9	
Female	75	31.1	
Marital status			
Married	201	83.4	
Single	25	10.4	
Widowed	11	4.6	
Divorced	4	1.7	
Household size			
< 6	98	40.7	7.0
6 – 10	97	40.2	
11 – 15	32	13.3	
> 15	14	5.8	
Educational status			
Adult	27	11.2	8.9
Primary	53	22.0	
Secondary	59	24.5	
Tertiary	35	14.5	
None	67	27.8	
Farming experience			
< 6	56	23.2	12.5
6 – 10	50	20.7	
11 – 15	40	16.6	
16 – 20	42	17.4	
> 20	53	22.0	
Farm size			
< 1.1	66	27.4	2.1
1.1 - 2.0	72	29.9	

2.1 - 3.0	65	27.0
3.1 - 4.0	23	9.5
> 4.0	15	6.2

Source: Field Survey, 2021

4.1.4 Educational status

Educational status of the respondents as presented in Table 4.1 revealed that 61% of the respondents attended formal education while 27.8% and 11.2% had non-formal and adult education respectively. This finding shows that more that most of the respondents in the study area had formal education and this may influence decision to utilize different off-farm income generation activities in order to improve their livelihood. The level of education influences the kind of opportunities available to improve livelihood strategies, enhanced food security, and reduction in the level of poverty (Etuk *et al.*, 2018). This finding is in agreement with Adeoye *et al*. (2019) who reported that level of formal education among farmers in Nigeria.

4.1.5 Farming experience

Farming experience result in Table 4.1 showed that 23.3% of the respondents had farming experience of <6 years while 22.0% had experience of >20 years. The mean farming experience of the respondents was 12.5 years, signifying that the respondents in the study area are well experienced and highly expose. Many years of experience could be advantageous in utilizing all forms of off-farm activities in order enhance farmers income and livelihood. This finding is in consonance with that of Babatunde and Qaim (2009) who reported highly experience farmers diversified into non-farm income activities in Nigeria.

4.1.6 Farm size

The results in Table 4.1indicated that 29.9% of respondent had farm size of between 1.1-2.0 hectares while 27.4% had <1.1 hectare. Also, 15.7% of the respondents had farm size of >3.1 hectares. The mean farm size of the respondents was 2.1 hectares, signifying that the respondents are small scale producing mainly for consumption and little percentage for sales. This finding agrees with that of Adeoye *et al.* (2019) who reported that larger proportion of household in Nigeria operate on small scale.

4.1.7 Crops grown

The results of various crops grown by the respondents as presented in Table 4.2 revealed that 78.0% of the respondents grows maize, while 63.1% grows yam. This implies larger proportion of the household were into maize and yam production. This did not come as a surprise because maize and yam are the major crops produce by farmers in Niger State. This finding is in agreement with that of Mohammed *et al.* (2020) who reported that yam and maize were produced by majority of farmers in Niger State of Nigeria. Also, 45.5%, 42.3% and 41.9% and 41.1% grown cowpea, sorghum, rice and soybean beans respectively. These cereals are also grown by majority of the farmers in Niger State due to agro-climatic condition that favour their production in large quantity. Mohammed *et al*. (2020) reported that Nigeria State agro-climatic condition is suitable for the production of majority of cereals produced in Nigeria. Further findings showed that 17.4%, 161.6%, 12.9%, 12.9%, 5.8% and 2.5% grown millet, cassava, groundnut, melon, pepper and vegetable respectively.

Table 4.2: Distribution of respondents according crop grown (n=241)

Crops grown	Frequency	Percentage
Rice	101	41.9
Yam	152	63.1
Cassava	40	16.6
Maize	188	78.0
Sorghum	102	42.3
Cowpea	109	45.2
Soybean	99	41.1
Vegetable	6	2.5
Millet	42	17.4
Groundnut	31	12.9
Melon	31	12.9
Pepper	14	5.8

Sources: Field Survey, 2021 **Multiple responses***

4.1.8 Access to farmland

The results in Table 4.3showed that all (100.0%) of the respondent access farm land. Also, 59.8% accessed farmland through inheritance while 13.7%, 13.3% and 13.3% accessed land through rent, gift and purchase respectively. This implies that the respondents had access to farmland for crop production, but most of the respondents inherited their farmland and do not need to pay before accessing land. This result is in agreement with Owoyemi (2009) who reported that inheritance was the major source of land acquisition in Nigeria.

Table 4.3: Distribution of respondents based on access to farmland and methods of acquisition

Variables	Frequency	Percentage
Access to farmland		
Yes	241	100.0
Method of farmland acquisition		
Gift	32	13.3
Inheritance	144	59.8
Purchase	32	13.3
Rent	33	13.7

Sources: Field Survey, 2021

4.1.9 Access and sources of farm inputs

The results in Table 4.4showed that 96.7% of the respondents accessed farm input while only 3.3% did not access farm inputs. This implies that majority of the respondents accessed farm inputs. Access to inputs increase farmers output and also enhance their involvement in off-farm activities that will enhance their livelihood. This finding concurs with that of Sidi *et al.* (2017) who reported majority of farmers under Growth Enhancement Support Scheme had access to inputs. More so, as revealed in Table 4.4, majority (78.0%) of the respondent got inputs from open market while 10.8%, 5.4% and 2.5% got inputs from extension agent, ADP, and fellow farmers. This implies that majority of the respondents accessed their inputs from open market. This result also concurred with the findings of Sidi *et al.* (2017) that majority of the farmers had access to inputs through open market and Growth Enhancement Support Scheme which is an intervention programme.

Table: 4.4: Distribution of respondents based on access and sources of inputs (n=241)

Variables	Frequency	Percentage
Access to farm inputs		
Yes	233	96.7
No	8	3.3
Sources of farm input		
None	8	3.3
Extension agent	26	10.8
Open market	188	78.0
ADP	13	5.4
Fellow farmers	6	2.5

Sources: Field Survey, 2021

4.1.10 Sources of farm labour

The result in Table 4.5 indicated that 76.8% of the respondents used both family and hired labour. This implies that majority of the respondents used both family and hired labour. On the other hand, 15.4% and 7.9% used hired and family labour respectively. This result agreed with that of Adeoye et al. (2019) who reported that both family and hired labour are mostly employed for farming activities in Nigeria.

Table 4.5: Distribution of respondents according to sources of labour (n=241)

Sources of farm labour	Frequency	Percentage
Family	19	7.9
Hired	37	15.4
Both	185	76.8

Sources: Field Survey, 2021

4.1.11 Access to extension

As revealed in Table 4.6, majority (88.8%) of the respondents had contact with extension agents, while 11.2% did not had contact with extension agents. This implies that most of the respondents had contact with extension agents, but few did not which could be due to several factors such as lack of awareness about extension visits. Also, 41.9%, 22.4% and 19.1% were visited by extension workers on monthly, bi-weekly and weekly basis, respectively. This implies that most of the respondents were contacted by extension agents on frequently which is very vital in enhancing information dissemination that could improve small-scale farmers' livelihood. This findings agrees with that of Amogne *et al.* (2017) who reported that adequate extension contacts with extension agents could have positive effect on the livelihood of rural household in their area.

4.1.12 Access to credit

Access to credit result as presented in Table 4.6 indicated that 37.8% of the respondents had access to credit, while 62.2% did not had access credit. This implies that majority of

the respondents did not had access to credit from either formal or informal institutions due to several factors including lack of collateral. This finding contradicts that of Sallawu *et al.* (2016) who found that most of their respondents had access to credit which is an important factor for rural household participation in non-farm activities. However, among the respondents that accessed credit, 14.1%, 13.3%, 6.6% and 3.7% accessed credit from cooperative, family and friend, agricultural bank and commercial bank.

4.1.13 Cooperative membership

The result of cooperative membership of the respondents in Table 4.6 revealed that 94.6% of the respondents belong to cooperative while 5.4%% did not belong to cooperative. This shows that majority of the respondents belong to cooperative. Membership of cooperative will enhance respondents' access to vital information and methods of improving their off-farm income that will improve their livelihood. This finding is in consonance with that of Yebisi (2014) who reported that membership of cooperative create an avenue of accessing vital information that will enhance farmers' enterprises.

Table 4.6: Distribution of respondents according to institutional variables (n=241)

Institutional variables	Frequency	Percentage
Extension		
Yes	214	88.8
No	27	11.2
Frequency		
None	27	11.2
Weekly	46	19.1
Bi-weekly	54	22.4
Monthly	101	41.9
Quarterly	13	5.4
Access to credit		
Yes	91	37.8
No	150	62.2
Sources of credit		
None	150	62.2
Agricultural Bank	16	6.6
Commercial Bank	9	3.7
Family & Friends	32	13.3
Cooperative	34	14.1
Cooperative membership		
Yes	228	94.6
No	13	5.4

Sources: Field Survey, 2021

4.2 Off-farm Diversification

Distribution of respondents according to off-farm income diversification in the study area is presented in Table 4.7. The result revealed that marketing (51.9%) ranked 1st as the most off-farm diversification engaged by respondents, implying that more than half of the respondents engaged in marketing of agricultural produce as a mean of livelihood. Petty trading such as provisions (23.2%) ranked 2nd. This implies that petty trading of goods such as provision is among the common off-farm income diversification of the respondents especially in the rural area. Meanwhile, commission agent (18.7%), civil service (18.3%) and tailoring were ranked 3rd, 4th and 5threspectively, among the off-farm income diversification of the respondents. Davis *et al.* (2017) reported that income from off-farm is accounted for up to half of the total household income of rural households in Africa. Similarly, Ogbanje *et al.* (2015) reported that majority of rural households receive

income from off-farm sources including self-employment activities. These activities, they noted were handicrafts, food processing, shop-keeping and trading on non-agricultural foods. Batool (2017) reported that most diversified farm families diversify income livelihood mainly into off-farm, self-employment such as engaging in agricultural wage-labour, small manufacturing factories, construction and transportation as a means of shielding themselves from risk and the uncertainties of agricultural production.

Table 4.7: Distribution of respondent according to off-farm diversification (n=241)

Variables	Frequency	Percentage	Rank
Marketing	125	51.9	1st
Petty trading	56	23.2	2nd
Commission agent	45	18.7	3rd
Civil servant	44	18.3	4th
Tailoring	36	14.9	5th
Motorcycle riding	30	12.4	6th
Knitting	27	11.2	7th
Carpentry	23	9.5	8th
Weaving	17	7.1	9th
Sales of herbs	7	2.9	10th
Bricklaying	13	5.4	11th
Mechanic/electrician	6	2.5	12th
Handcraft	6	2.5	12th
Car driving	5	2.1	14th
Repairs	5	2.1	14th
Black smiting	4	1.7	16th
Plumbing	2	0.8	17th

Sources: Field Survey, 2021 **Multiple response**

4.2.1 Off-farm income distribution

Table 4.8 showed the distribution of respondents according to annual income from off-farm diversification. It showed that bricklaying and civil service ranked 1st and 2nd respectively. Also, commission agents and car driving ranked 3rd and 4th, respectively among the highest income from off-farm income diversification of the respondents. This implies that income from bricklaying, civil service, commission agents and car driving were the highest among other off-farm income diversification by the respondents. This finding agrees with Obinna and Onu (2017) who opined that the meager income derived

from farm enterprises compels households in rural African societies to engage in off-farm activities to supplement income, in order to lessen risk inherent in income from agricultural activities. Nagler and Naudé (2017) was of the view that the upsurge in non-farm activities is probably due to the renew level of development in rural areas of Nigeria particularly since the advent of democratic governance in 1999, which has brought about significant transformation in social amenities in several rural areas.

Also, car driving, carpentry, motorcycle, marketing, mechanic/electrician, tailoring, repairs, handcraft, petty trading, weaving, plumbing, sales of herbs and knitting ranked 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th and 17th respectively. This finding is in agreement with Batool (2017) who stated that diversifying into off-farm income activities as means of shielding farmers from risk and the uncertainties of agricultural production. Odoh *et al.* (2019) reported that off-farm processing, petty-trading, rental services, civil and public service were the major off-farm income diversification activities among rural households in South East, Nigeria.

Table 4.8: Distribution of respondents according to annual income (n=241)

Variables	Income (₦)	Rank
Bricklaying	68,076.92	1st
Civil servant	67,075.00	2nd
Commission agent	61,311.11	3rd
Car driving	57,400.00	4th
Carpentry	52,173.91	5th
Motorcycle riding	51,733.33	6th
Marketing	44,704.00	7th
Mechanic/electrician	32,166.67	8th
Tailoring	31,722.22	9th
Repairs	26,200.00	10th
Handcraft	24,500.00	11th
Petty trading	24,053.57	12th
Weaving	15,882.35	13th
Plumbing	15,000.00	14th
Black smiting	9,325.00	15th
Sales of herbs	8,142.86	16th
Knitting	6,416.67	17th

Sources: Field Survey, 2021

4.3 Benefits of Off-farm

Table 4.9 revealed that increase in personal income (93.8%) ranked 1st as the most benefits of off-farm activities in the study area, followed by improving in standard of living ranked 2nd. This implies that majority benefited from increase in income and improved standard of living from off-farm activities. This concurs with Viaggi (2017) who reported that improved in standard of living and income were the output of income diversification among rural farmers in Sub-Sahara Africa. Senadza (2014) reported that increase in income is a major benefit of income diversification in Africa. More so, the results showed that 78.0% and 75.5% of the respondents benefitted from increased agro-processing output and enhanced competence and self-reliance ranked 3rd and 4th respectively. Other findings revealed that 75.1%, 74.3%, 60.2%, 58.9%, 55.6% and 53.5% benefitted from improved livelihood opportunities, enhanced household food security, enhanced social status, engaged in work all year round, safe guard against risk and enhanced social networking ranked 5th, 6th, 7th, 8th, 9th and 10th respectively.

Table 4.9: Distribution of respondents based on benefits from off-farm diversification (n=241)

Variables	Frequency*	Percentage	Rank
Increased personal income	226	93.8	1st
Improved standard of living	199	82.6	2nd
Increased agro-processing output	188	78.0	3rd
Enhanced competence and self-reliance	182	75.5	4th
Improved livelihood opportunities	181	75.1	5th
Enhanced household food security	179	74.3	6th
Enhanced social status	145	60.2	7th
Engaged in work all year round	142	58.9	8th
Safe-guard against risk	134	55.6	9th
Enhanced social networking	129	53.5	10th

Sources: Field Survey, 2021 ***Multiple response**

4.3.1 Factors influencing diversification into off-farm income activities

Multivariate regression estimate as presented in Table 4.10 showed factors influencing the small-scale crop farmers' diversification into off-farm income activities. The coefficient of age (-0.0167) of the small-scale farmers that engaged in tailoring was negative significant at 1% level of probability, implying that as small-scale farmers that engage in tailoring advances in age, their eagerness to diversify into off-farm income reduces. This finding is in line with that of Odoh and Nwido (2017) who reported that older farmers tends to have lower off-farm income diversification. The coefficient of marital status for marketers/traders (0.1198), weaving/knitting (0.0735), mechanic/electrician (0.1052) and transportation (0.0826) were positively significant at 1%, 10% , 1% and 10% level of probability, implying married small-scale farmers are more likely to diversify into off-farm income activities in order to cater for family needs. The coefficient of sex under tailoring (-0.1791) was negatively significant at 1% level of probability, implying women involvement in off-farm diversification activities. Also, the coefficient of sex under weaving/knitting (0.2480) and transportation (0.1860) were both positively significant at 1% level of probability, showing that involvement of men in diversification will increase their off-farm income.

The coefficient of household size under marketers/traders (0.0306) and bricklaying (0.0283) were both positively significant at 5% and 1% level of probability, indicating that small-scale farmers with higher household are likely to diversify into off-farm activities. The coefficient of household size under plumbing (-0.0023) was negatively significant at 5% level of probability. The coefficient of experience (0.0163) was positively significant at 5% level of probability under tailoring, signifying that more years of experience of tailoring increase their diversification into off-farm activities.

Table 4.10: Estimates of multivariate probit regression on factors influencing off-farm diversification(n=241)

Variables	Marketing/ Trading Coefficient	Tailoring Coefficient	Plumbing Coefficient	Carpentry Coefficient	Civil servant Coefficient	Weaving/ knitting Coefficient	Bricklaying Coefficient	Handcraft Coefficient	Mechanic/ Electrician Coefficient	Sales of herbs Coefficient	Transportation Coefficient
Age	0.0069 (1.30)	-0.0167 (-2.87***)	0.0062 (1.54)	-0.0031 (-0.73)	0.0121 (2.11)	0.0028 (0.58)	-0.0037 (-1.06)	0.0019 (0.30)	-0.0065 (-1.40)	0.0041 (0.87)	0.0016 (0.27)
Marital status	0.1198 (2.63***)	0.0597 (1.21)	-0.0359 (-1.04)	-0.0211 (-0.57)	-0.0762 (-1.57)	0.0735 (1.80*)	-0.0320 (-1.06)	0.0789 (1.48)	0.1052 (2.66***)	-0.0375 (-0.93)	0.0826 (1.68*)
Sex	-0.0749 (-1.21)	-0.1791 (-2.67***)	0.0462 (0.99)	-0.0899 (-1.80)	0.1001 (1.52)	0.2480 (4.50***)	-0.0411 (-1.01)	0.0756 (1.05)	-0.0364 (-0.68)	0.0723 (1.32)	0.1860 (2.80***)
Household size	0.0306 (2.09**)	0.0149 (0.94)	-0.0023 (2.09*)	0.0161 (1.36)	-0.0186 (-1.20)	-0.0103 (-0.80)	0.0283 (2.93***)	0.0113 (0.66)	0.0153 (1.21)	0.0014 (0.11)	-0.0200 (-1.27)
Experience	0.0046 (0.67)	0.0163 (2.19**)	-0.0019 (-0.38)	-0.0019 (-0.34)	0.0036 (0.50)	0.0035 (0.57)	0.0037 (0.82)	-0.006 (-0.69)	0.0037 (0.63)	-0.0088 (-1.45)	-0.0104 (-1.41)
Education	-0.0012 (-0.34)	-.0009 (-0.23)	1.2e-04 (-0.00)	0.0069 (2.35**)	0.0138 (3.58***)	-0.0028 (-0.86)	0.00192 (0.81)	-0.0023 (-0.55)	0.0012 (0.37)	-0.0051 (-1.59)	0.0118 (3.03***)
Income	5.09e-07 (2.34**)	-3.31e-07 (-1.40)	5.83e-09 (0.04)	7.34e-08 (0.42)	4.69e-07 (2.03**)	-2.92e-07 (-1.50)	-6.81e-08 (-0.47)	5.60e-07 (2.20**)	1.43e-07 (0.76)	-4.76e-08 (-0.25)	-1.74e-07 (-0.74)
Livelihood	0.4474 (2.06**)	1.0641 (4.50***)	0.8218 (5.00***)	0.4769 (2.71***)	1.5865 (6.84**)	2.4465 (12.59***)	0.0125 (0.09)	1.9195 (7.53***)	1.3205 (7.01***)	1.5488 (8.03***)	0.4602 (1.96*)
Access to credit	-0.0476 (-0.94)	0.0969 (1.77*)	0.0396 (1.04)	-0.1291 (-3.16***)	0.1334 (2.47***)	-0.0345 (-0.76)	-0.0580 (-1.73*)	-0.0308 (-0.52)	0.0748 (1.71*)	-0.0454 (-1.01)	0.0897 (1.65)
Extension	0.0479 (2.00**)	0.0248 (-0.95)	-0.0145 (-0.80)	0.0226 (1.17)	-0.0188 (-0.74)	-0.0222 (-1.04)	0.0007 (0.04)	0.0287 (1.02)	0.0300 (1.45)	0.00588 (0.27)	0.0073 (0.28)
Cooperative	0.0090 (1.41)	-0.0034 (-0.50)	0.00397 (0.83)	-0.0049 (-0.96)	-0.0153 (2.26**)	0.0003 (0.06)	-0.0111 (-2.63***)	0.0103 (1.38)	0.0038 (0.69)	-0.0085 (-1.50)	0.0168 (2.46**)
Constant	0.7953 (5.31***)	0.5047 (3.10***)	-0.1272 (-1.12)	0.1090 (0.90)	-0.3903 (-2.44**)	0.0814 (0.61)	0.1525 (1.54)	-0.2916 (-1.66*)	-0.2415 (-1.86*)	-0.0611 (-0.46)	-0.1835 (-1.14)

Sources: Field Survey, 2021

*** implies significant at 1% level of probability, ** implies Significant at 5% level of probability, * implies significant at 10% level of probability

Note: Values in parentheses are the Z-value

The coefficient of education of carpentry (0.0069), civil service (0.0138) and transportation (0.0118) were significant at 5%, 1% and 1% level of probability, implying that increase in literacy level of carpenters, civil servants and transporters will positively influence their diversification into off-farm income activities. This is not surprising, as education facilitates access to a number of different economic activities, either as a formal requirement for wage earning jobs or because it helps setting up and managing own small businesses (Babatunde and Qaim, 2009).

The coefficient of income under marketing/trading (5.09e-07), civil service (4.69e-07) and handcraft (5.60e-07) were all significant at 5% level of probability, implying that increase in income of marketers'/traders, civil servant and handcraft will have positive influence on the respondents' diversification into off farm income activities. This finding agreed with that of Odoh *et al.* (2019) who revealed that increases in income will influence farmers' participation in off-farm activities.

The coefficient of livelihood status of the respondents under marketing/trading, tailoring, plumbing, carpentry, civil servant, weaving/knitting, bricklaying, mechanic/electricians, sale of herbs and transportation were all positively significant at1% 5% and 10% level of probability, showing that increase livelihood status of small-scale farmers will have positive influence on their diversification into off-farm income activities. This implies that farmers with enhanced livelihood status could easily diversify into off-farm income activities.

The coefficient of access to credit under tailoring (0.0969), civil service (0.1334) and mechanic/electrician (0.0748) were positively significant at 10%, 1% and 10% level of probability, implying that access to credit by tailoring, civil servants and mechanic/electrician will positively influence their diversification into off-farm income.

This is not surprising, as credit can reduce liquidity constraints and increase the capacity of households to start off-farm businesses (Babatunde and Qaim, 2009).

Also, the coefficient credit under carpentry (0.1291) and bricklaying (-0.0580). The coefficient of cooperative (0.0169) under transportation was positive and significant at 5% level of probability, implying that cooperative membership by transporters could influence their diversification into off-farm income. However, the coefficient of cooperative (-0.0153) under civil service was negative and significant at 5% level of probability, implying an inverse influence on off-farm income diversification.

4.4 Assets of Small Scale Farmers

4.4.1 Types of household assets owned by the respondents

Result of household assets of the respondents as presented in Table 4.11 revealed that land had mean number of 1.52. This implies that land is the most household assets owned by respondents. This was followed number of furniture with mean number of 1.28. Other household assets were radio (1.18), video (1.13), motorcycle (1.12), television (1.07), house (1.04) and car (1.00). This implies that the respondents owned at least one household assets. Ownership of numerous household assets could indicate improved livelihood among the small-scale framers. This finding agreed with Olughu (2019) who reported that majority of farmers in Kaduna State of Nigeria have different types of household assets as a sign of improved livelihood.

Table 4.11: Distribution of respondents according to types of household asset (n=241)

Types of household assets	Minimum	Maximum	Mean	Std. Deviation
Number of Land	1	3	1.52	0.655
Number of Furniture	1	4	1.28	0.665
Number of House	1	2	1.04	0.198
Number of Car	1	1	1.00	0.000
Number of Motorcycle	1	2	1.12	0.326
Number of Video	1	3	1.13	0.373
Number of Television	1	3	1.07	0.281
Number of Radio	1	3	1.18	0.423

Sources: Field Survey, 2021

4.4.2 Value of household assets

Also, Table 4.12 revealed mean value of house to be ₦1,187,828.28, while mean value of land was ₦967,142.86. This implies that the value of house and land in the study area was much higher than other household assets owned by the respondents because they are fixed asset which could attract better value in the long run. This is not surprising as the value of land and house cannot be compared with other assets. Also, mean value of motorcycle was ₦231,794.87, car (₦213,666.67), furniture (₦73,366.34), television (₦38,951.13), radio (₦14,840.79) and video (₦14,429.76). This finding concur with Olughu (2019) who reported that house and land are the most valuable household assets owned by the farmers in Kaduna State of Nigeria.

Table 4.12: Distribution of respondents according to value of household assets (n=241)

Value of household assets	Minimum	Maximum	Mean	Std. Deviation
Value of Car	40,000	1,000,000	213,666.67	181,141.90
Value of Furniture	5,000	160,000	73,366.34	48,582.04
Value of House	10,000	9,000,000	1,187,828.28	1,187,503.63
Value of Land	400,000	2,100,000	967,142.86	619,024.40
Value of Motorcycle	80,000	540,000	231,794.87	90,235.47
Value of Video	5,500	75,000	14,429.76	10,669.67
Value of Television	8,000	115,500	38,951.13	19,414.72
Value of Radio	1,500	40,000	14,840.79	12,612.76

Sources: Field Survey, 2021

4.4.3 Livestock assets

Result of livestock assets of the respondents as presented in Table 4.13 indicated that the mean number of pigeon owned by the respondents was 23.19, followed by local chicken and horse with mean number of 20.00 and 20.32, respectively. In most of the rural areas, pigeon and local chicken are some of the off-farm activities engaged by small scale farmers for augmenting income from farm. Also, bull/oxen had mean number of 2.20, broiler (13.77), cockerel (9.00), guinea fowl (7.20), duck (5.10), turkey (4.04), goat (3.93), sheep (3.42), cow (1.74) and dogs (1.29).This implies that most of the respondents in the study area diversify into livestock options. However, the least owned livestock asset by the respondents were cow and dogs which might be due to high cost and religious belief. The result is in consonance with that of Bulus (2016) who reported that larger proportion of farmers in Kaduna State own livestock assets.

Table 4.13: Distribution of respondents according to type of livestock assets (n=241)

Types of livestock assets	Minimum	Maximum	Mean	Std. Deviation
Number of Cow	1	4	1.74	0.972
Number of Bull/Oxen	1	5	2.20	1.135
Number of Sheep	1	10	3.42	2.065
Number of Goat	1	15	3.93	2.192
Number of Local Chicken	1	300	20.32	33.426
Number of Broiler	2	100	13.77	19.004
Number of Cockrel	2	30	9.00	10.918
Number of Turkey	2	10	4.04	2.490
Number of Pigeon	1	60	23.19	17.097
Number of Duck	1	32	5.10	4.989
Number of Guinea-Fowl	1	23	7.20	5.616
Number of Horses	20	20	20.00	0
Number of Dogs	1	3	1.29	0.550

Sources: Field Survey, 2021

4.4.4 Value of livestock assets

Also, Table 4.14 indicated that mean value for bull/oxen was ₦294,267.00, followed by cow with mean value of ₦213,267.44. This implies that Bull/Oxen and cow were the most valuable livestock assets owned by the respondents in the study area. The mean value for other livestock asset are sheep (₦57,449.07), goat (₦54,300.75), turkey (₦36,061.54), local chicken (₦28,284.77), duck (₦17,031.71), broiler (₦14,040.88), pigeon (₦12,200.00), Cockrel (₦12,100.00), guinea fowl (₦11,590.00), horses (₦10,000.00) and dogs (₦7,820.83). This result tallies with that of Bulus (2016) who reported that bull/oxen and cow are the most valuable livestock assets owned by farmers in Kaduna State

Table 4.14: Distribution of respondents according to value of livestock assets (n=241)

Value of livestock assets	Minimum	Maximum	Mean	Std. Deviation
Value of Cow	65,000	600,000	213,267.44	116,226.900
Value of Bull/Oxen	82,000	500,000	294,200.00	148,992.021
Value of Sheep	2,000	300,000	57,449.07	44,138.955
Value of Goat	3,000	300,000	54,300.75	45,574.682
Value of Local Chicken	1,000	400,000	28,284.77	52,430.466
Value of Broiler	4,000	35,000	14,040.38	8,716.582
Value of Cockrel	4,600	30,000	12,100.00	10,509.234
Value of Turkey	2,800	85,000	36,061.54	23,844.799
Value of Pigeon	3,000	22,800	12,200.00	5,688.585
Value of Duck	2,800	72,000	17,031.71	16,378.804
Value of Guinea-Fowl	2,400	30,000	11,590.00	7,002.097
Value of Horses	10,000	10,000	10,000.00	0
Value of Dogs	1500	30000	7820.83	6521.935

Sources: Field Survey, 2021

4.4.5 Types of working assets

Result of working assets of the respondents as presented in Table 4.15 revealed that the number of hoe owned by the respondents was 4.65, followed by fish smoking kiln with mean number of 2.73. This implies that hoe for farming operations and smoking kiln for fish processing were the main working assets owned by the respondents in the study area. Other working assets include hunting trap with mean number of 2.57, cutlass (2.25), fishing gear (2.13), matchets (1.96), working bull (1.80), tube well (1.56), bicycle (1.36), water pump (1.14), grinding machine (1.11), ox-cart (1.00) and milling machine (1.00). This finding agrees with that of Mohammed *et al.* (2020) who reported that most of their respondents had numerous working assets. Thus, access to working assets could increase the livelihood status of rural farming populace.

Table 4.15: Distribution of respondents according to working assets (n=241)

Working assets	Minimum	Maximum	Mean	Std. Deviation
Number of Matchets	1	6	1.96	1.132
Number of Cutlasses	1	6	2.25	1.196
Number of Hoes	1	15	4.65	3.135
Number of Work Bull	1	2	1.80	0.447
Number of Water-pump	1	3	1.14	0.430
Number of Bicycle	1	9	1.36	1.429
Number of Ox-Cart	1	1	1.00	0.000
Number of Milling Machine	1	1	1.00	0.000
Number of Hunting Traps	1	6	2.57	1.207
Number of Fish Smoking Kiln	2	3	2.73	0.452
Number of Fishing Gear	2	3	2.13	0.354
Number of Tube well	1	3	1.56	0.726
Number of Grinding Machine	1	2	1.11	0.321

Sources: Field Survey, 2021

4.4.6 Value of working assets

Also, Table 4.16 showed that the mean value of milling machine was ₦449,611.11 followed by working bull with mean value of ₦294,000.00. This implies that milling machine for processing and working bull are the most valuable assets owned by the respondents. Thus, animal traction is being used by the small-scale farmers in their farming operations in the study area. Other working assets include water-pump with mean value of ₦46,714.29, fishing gear (₦43,625.00), grinding machine (₦43,272.73), tube well (₦29,889.89), bicycle (₦24,234.37), fish smoking kiln (₦11,653.85), ox-cart (₦9,000.00), hoes (₦8,819.27), hunting traps (₦4,102.38), matchets (₦3,454.46) and cutlasses (₦2,989.27). This finding also agrees with that of Mohammed *et al.* (2020) who reported that milling machine, working bull and fishing gear are the most valuable working assets among the respondents in their study area.

Table 4.16: Distribution of respondents according value working assets (n=241)

Value of working assets	Minimum	Maximum	Mean	Std. Deviation
Value of Matchets	500	30,000	3,454.46	3,477.277
Value of Cutlasses	600	24,000	2,989.27	2,751.373
Value of Hoes	500	48,000	8,819.27	9,443.632
Value of Work Bull	140,000	500,000	294,000.00	146,560.568
Value of Water-pump	35,000	120,000	46,714.29	17,529.087
Value of Bicycle	10,000	50,000	24,234.37	7,155.289
Value of Ox-Cart	9,000	9,000	9,000.00	0.000
Value of Milling Machine	150,000	1,700,000	449,611.11	534,940.144
Value of Hunting Traps	2,000	8,000	4,102.38	1,664.818
Value of Fish Smoking Kiln	10,000	16,000	11,653.85	1,848.076
Value of Fishing Gear	20,000	60,000	43,625.00	15,927.851
Value of Tube well	20,000	45,000	29,888.89	10,913.804
Value of Grinding Machine	22,000	87,000	43,272.73	20,812.970

Sources: Field Survey, 2021

4.4.7 Livelihood status of small scale farmers

Distribution of the respondents based on their livelihood status as presented in Table 4.17 showed that 75.1% of the small-scale farmers have low livelihood status implying that they fall within the livelihood index of less than 0.51, while 20.3% had moderate livelihood status. Also, only (4.6%) had high livelihood status. This finding implies that majority of the respondents had low livelihood status as evidence by mean livelihood index of 0.2014. This could negatively affect off-farm income diversification in the study area due to poor resources. This finding contradicts with that of Ifeanyi-obi and Mathews-Njoku (2014) who revealed that majorities of farmers in South East of Nigeria had high livelihood. Also, Afeez *et al*. (2016) revealed that most of the rural women farmers in Oyo State, Nigeria, had moderate livelihood.

Table 4.17: Distribution of the respondents based on their livelihood status (n=241)

Livelihood status	Frequency	Percentage
High (0.76 – 1.00)	11	4.6
Moderate (0.51 – 0.75)	49	20.3
Low (0.01 – 0.50)	181	75.1
Total	241	100.0
Mean Livelihood Index	0.2014	
Minimum Livelihood Index	0.0588	
Maximum Livelihood Index	0.5294	

Sources: Field Survey, 2021

4.5 Effect of off-farm income diversification on livelihood of small-scale farmers

Tobit regression estimate result as presented in Table 4.18 showed effect of off-farm income diversification on the livelihood of small-scale farmers. It revealed Chi-square statistic value of 151.98 which is statistically significant at 1% level of probability implies that the model has strong explanatory power and adequate to make any useful inference. The result indicated that the coefficient of age (-0.0023) was negative and significant at 10% level of probability, implying that as small-scale farmers' age increases, their ability to diversify into off-farm income enterprises decreases resulting to poor livelihood status. This could also be attributed to the fact that mental and physical energy required for improved livelihood declines with age. This finding agrees with that of Odoh and Nwido (2017) who reported in their study in South Eastern States of Nigeria that increase in age of farmers had effects on their livelihood status. The coefficient sex (0.0257) was positive and significant at 10% level of probability, implying that as more men engaged in off-farm diversification activities, the better the livelihood of the small-scale farmer. This shows that men are the breadwinner of most household in the study area.

Table 4.18: Effect of off-farm income diversification on livelihood of small-scale farmer

Variables	Coefficient	Z-value
Age	-0.0023	-1.85*
Sex	0.0257	1.76*
Household size	0.0104	2.97**
Education	0.0035	4.16***
Experience	0.0036	2.25**
Farm size	0.0150	2.03**
Access to inputs	-0.0165	-0.49
Access to credit	0.0263	2.16**
Extension	0.0133	2.24**
Cooperative	0.0056	3.84***
Off-farm income	5.25e-07	10.40***
Constant	0.2638	6.34***
Diagnostics statistic		
Chi-squared	151.98***	

Sources: Field survey, 2021

*** significant at 1% level of probability, **=Significant at 5% level of probability, , *=significant at 10% level of probability

The coefficient of education (0.0035) was positive and significant at 1% level of probability, signifying that the increase in literacy level among small scale farmers will enhance their involvement in off-farm activities in order to better their livelihood. This is consonant with Shehu and Abubakar (2015) who reported that educated and younger ones were more likely to diversify into off-farm economic activities due to their determinant and passion for improved livelihood. The coefficient of farming experience (0.0036)was positive and significant at 1% level of probability. This denotes that many years of experience in farming will lead to improve livelihood. This finding is in agreement with that of Ayantoye *et al.* (2017) who reported that many years in non-farm activities could eventually translate to improve livelihood. The coefficient of farm size (0.0150) was

positive and significant at 5% level of probability, signifying that access to more farm land will translate to better output and improve livelihood. This agrees with Aniedu (2016) who established that an increase in farm size led to an increase in yam production technologies in Abia State, Nigeria.

The coefficient of access to credit (0.0263) was positive and significant at 5% level of probability, implying access to credit from either formal or informal institutions is expected to better their livelihood. This finding is in agreement with that of Ayoade *et al.* (2012) who reported that access to credit will improved the livelihood of cassava farmers in Oyo State, Nigeria. The coefficient extension (0.0133) was positive and significant at 1% level of probability. This signifies that more extension visit will favour farmers' livelihood. This is because extension is always associated dissemination improved knowledge, skills and innovation that is expected to improve farmers' livelihood. This finding concurs with that of Chekene (2015) also maintained that access to extension by the farmers reduced the risk of adopting new technologies in Borno State, Nigeria

The coefficient of cooperative (0.0056) was positive and significant at 1% level of probability, implying that membership of cooperative and association will enhance small-scale farmers' livelihood. This finding concur with that of Adeoye *et al.* (2019) who reported that membership of cooperative increases rural household income diversification in Nigeria. The coefficient of off-farm income (5.25e-07) was positive and significant at 1% level of probability, implying that increased participation in off-farm income generating activities could increase the livelihood status of small-scale farmers. This shows that there is significant effect of off-farm income diversification on livelihood of the respondents in the study area which is in conformity with the *apriori* expectation. This finding agrees with that of Odoh and Nwibo (2017) who reported that farm households with high income base tend to have high propensity to diversify for enhanced livelihood.

4.6 Constraints mitigating the small-scale farmers' off-farm income diversification

The result of the constraints mitigating small-scale crop farmers off-farm diversification as presented in Table 4.19 revealed that inadequate capital ($\bar{X}$ = 4.46) rank 1st as the major constraint mitigating the small-scale farmer to diversify into off-farm activities. This was followed by climatic and risk uncertainty ($\bar{X}$ = 3.39) ranked 2nd. Most farmers are risk averters as they have make appropriate decision in resources allocation. Poor marketing facilities in rural areas ($\bar{X}$ = 3.80) ranked 3rd while poor infrastructure ($\bar{X}$ = 3.76) ranked 4th. This study agrees with that of Khatun and Roy (2012) who reported that lack of capital, poor marketing and lack of infrastructure were the major problem to off-farm activities in Nigeria. Similar studies by Ewebiyi and Meliudu (2013) have identified lack of infrastructural facilities inadequate livelihood asset and poor transportation system as the constraints to livelihood diversification.

Unavailability of government support projects ($\bar{X}$ = 3.70), poor access to credit ($\bar{X}$ = 3.67). This finding corroborates Iyanda *et al.* (2014) who reported that access to credit especially informal credit are critical for enterprise diversification in Yewa-North of Ogun State. Lack of appropriate technology ($\bar{X}$ = 3.63) ranked 5th, 6th and 7th respectively. Other results showed that small market size in the rural area ($\bar{X}$ = 3.50), inadequate capacity building and training ($\bar{X}$ = 3.31) poor exposure to various opportunities ($\bar{X}$ = 3.31), lack of entrepreneurship skills ($\bar{X}$ = 3.29) ranked 8th, 9th and 11th respectively. However, revealed that inadequate time to pursue diversification strategies ($\bar{X}$ = 2.92), inability to take risk ($\bar{X}$ = 2.91), problem of illiteracy ($\bar{X}$ = 2.87) and norm and religious value ($\bar{X}$ = 2.43) ranked 12th, 13th, 14, and 15th respectively.

Table 4.19: Constraints mitigating small-scale farmers off-farm income diversification (n=241)

Variables	VSC	SC	UN	NSC	NC	Sum	Mean	Rank
Inadequate capital	170 (70.5)	43 (17.8)	8 (3.3)	9 (3.7)	11 (4.6)	1075	4.46	1st
Climatic risk and uncertainty	106 (44.0)	63 (26.1)	43 (17.8)	17 (7.1)	12 (5.0)	957	3.97	2nd
Poor marketing facilities in the rural areas	70 (29.0)	109 (45.2)	16 (6.6)	36 (14.9)	10 (4.1)	916	3.80	3rd
Poor infrastructure	77 (32.0)	87 (36.0)	38 (15.8)	20 (8.3)	19 (7.9)	906	3.76	4th
Unavailability of government support project	78 (32.4)	71 (29.5)	46 (19.1)	34 (14.1)	12 (5.0)	892	3.70	5th
Poor credit to access	75 (31.1)	79 (32.8)	31 (12.9)	44 (18.3)	12 (5.0)	884	3.67	6th
Lack of appropriate technology	65 (27.0)	86 (35.7)	39 (16.2)	39 (16.2)	12 (5.0)	876	3.63	7th
Small market size in the rural area	39 (16.2)	105 (43.6)	47 (19.5)	38 (15.8)	12 (5.0)	844	3.50	8th
Inadequate capacity building and training	17 (7.1)	115 (47.7)	59 (24.5)	26 (10.8)	24 (10.0)	798	3.31	9th
Poor exposure to various opportunities	21 (8.7)	105 (43.6)	63 (26.1)	32 (13.3)	20 (8.3)	798	3.31	9th
Lack of entreneurial skills	32 (13.3)	75 (31.1)	71 (29.5)	57 (23.7)	6 (2.5)	793	3.29	11th
Inadequate time to pursue diversification strategies	16 (6.6)	58 (24.1)	77 (32.0)	70 (29.0)	20 (8.3)	703	2.92	12th
Inability to take risk	11 (4.6)	48 (19.9)	109 (45.2)	54 (22.4)	19 (7.9)	701	2.91	13th
Problem of illiteracy	22 (9.1)	51 (21.2)	66 (27.4)	78 (32.4)	24 (10.0)	692	2.87	14th
Norms and religious value	21 (8.7)	29 (12.0)	55 (22.8)	64 (26.6)	72 (29.9)	586	2.43	15th

Sources: Field Survey, 2021

4.7 Hypotheses Tested

4.7.1 Hypothesis 1

The result of hypothesis I which stated that there is no significant relationship between selected socio-economic characteristic of the respondents and their livelihood status was tested using the z—value from the Tobit regression is presented in Table 4.20. It revealed age (-1.85), sex (1.76), household size (2.97), education (4.16), experience (2.25) and farm size (2.03) were all significant at 1%, 5% and 10% level of probability, respectively. Therefore, we reject the null hypothesis and accept the alternative hypothesis which states that there is significant relationship between selected socio-economic characteristic of the respondents and their livelihood status as evident from the Tobit regression.

Table 4.20: Tobit regression estimate z-value test for hypothesis I

Variables	Coefficient	Z-value
Age	-0.0022298	-1.85*
Sex	0.0256825	1.76*
Household size	0.0103716	2.97**
Education	0.0035909	4.16***
Experience	0.0036185	2.25**
Farm size	0.0150177	2.03**

Sources: Field survey, 2021

*** significant at 1% level of probability, **=Significant at 5% level of probability, , *=significant at 10% level of probability

4.7.2 Hypothesis 2

The result of hypothesis II which stated that there is no significant relationship between selected off-farm income diversification of the respondents and their livelihood status was tested using Pearson's Product Moment Correlation (PPMC) is presented in Table 4.21. It revealed r value of 0.8841 which implies a positively strong relationship between off-farm income and the livelihood status of the farmers. Therefore, we reject the null hypothesis and accept the alternative hypothesis which states that there is relationship

between the off-farm income diversification of the small-scale farmers and their livelihood status.

Table 4.21: Relationship between the off-farm income diversification and livelihood status

Variable	Off-farm income	Livelihood status
Off-farm income	1.0000	
Livelihood status	0.8841***	1.0000

Sources: Field Survey, 2021
Note:*** implies positively strong correlation

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Based on the study, it can be concluded that small scale farmers were active, mostly male and married. Also, most of the small-scale farmers' formal education, high experience in farming and operate on small size of farm land. Maize and yam were the major crop grown as majority of the respondents have access to farm inputs, extension service delivery and belong to cooperative. In terms of off-farm income diversification, marketing, petty trading, civil servant and tailoring were the most off-farm income diversification engaged by small scale farmers. Thus, they were able to benefit from increased personal income, improved standard of living and increased production output. However, age, marital status, sex, household size, experience, education, income, livelihood status, access to credit and cooperative were found to influence small scale farmers' diversification into off-farm income diversification.

The main household assets owned by the small-scale farmers were land properties and furniture were the most household assets; livestock asset was poultry birds and working assets such as hoe and fish smoking kiln. However, most of the small-scale farmers have low livelihood status, while age, sex, household size, education, experience, farm size, access to credit, extension, cooperative and off-farm income were found to influence livelihood status of the small-scale farmers. Thus, off-farm income diversification have significant effect on the small-scale farmers' livelihood status. The major constraints mitigating against small-scale farmers off-farm income diversification were; inadequate capital, climatic and risk uncertainty, poor marketing facilities in rural areas and poor infrastructure.

5.2 Recommendations

i. Majority of small-scale farmers have low livelihood status in the study area. Therefore, small scale farmers should diversify into viable off-farm activities in order to improve their livelihood status.

ii. Inadequate capital is one of the major problems mitigating against small scale farmers in the study area. However, farmers should seek for aid from formal and informal sources of credit for improved livelihood

iii. The study revealed that the small-scale farmers diversify into several off-farm income activities. However, there is need for enhanced engagement particularly among the young farmers in order to improved on the overall livelihood status of the rural area.

iv. The study recommended that the small-scale farmers should endeavor to enroll with insurance company like National Agricultural Insurance Company (NAIC)about their on-farm and off-farm activities in order to minimize risk and uncertainties.

v. Financial institutions like Bank of Agriculture should provide flexible credit facilities to small scale farmers in order to enhance their participation in off-farm income diversification for improved livelihood status.

REFERENCES

Adedayo, O. O. (2005). Sources and uses of agricultural credit by small-scale farmers in Surulere Local Government Area of Oyo State, Nigeria. *Anthropologist,* 10 (4), 313 – 314.

Adeoye, I. D., Seini, W., Sarpong, D. B. & Amegash, D. (2019). Off‐farm income diversification among rural farm households in Nigeria, *Agricultura Tropica Et Subtropica*, 52/3–4, 149–156

Adepoju, A. O. &Oyewole, O. O. (2014). Rural livelihood diversification and income inequality in Akinyele Local Government Area, Ibadan, Oyo State, Nigeria. *Journal of Agricultural Sciences*, 59 (2), 175 – 186.

Adewale, J. G., Oladejo, J. A. & Ogunniyi, L. T. (2015). Economic contribution of farm children to agricultural production in Nigeria: A case study of Ekiti State. *Journal of Social Science,* 10 (2), 149–152.

Afeez, B. A., Adebola, S. D., Olufunmilola, A. & Abiodun, O. O. (2016). Determinants of rural women well-being in Ibarapa-North Local Government Area of Oyo State. *Journal of Human and Ecology*, 56(2), 41 – 46.

Ahituv, A. & Kimhi, A. (2002). Off-farm work and capital accumulation decisions of farmers over the life-cycle: The role of heterogeneity and state dependence.*Journal of Development Economics,* 68 (2), 329 – 353.

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.

Ajayi, O. J., Muhammed, Y., Yusuf, L.T. & Ajibola, R. T. (2020). Climate change adaptation strategies among groundnut farmers in Suleja LGA of Niger State, Nigeria. *Ethiopian Journal of Environmental Studies and Management,* 13 (4), 414 – 424.

Akinnagbe, O. M., Agwu, A. E. &Igbokwe, E. M. (2008). Agricultural Extension Policy for Enhancing Women Participation in Sustainable agricultural development in Nigeria. In: S. F. Adedoyin (Eds.), Developing Agricultural Extension Policy for Nigeria Proceedings of the 13th Annual National Conference of AESON 8 – 11 April, 2008.

Akinwale, A.A. (2010). Livelihood and environmental challenges in coastal communities of Nigeria. *Journal of Sustainable Development in Africa*, 12 (8), 79 – 88.

Aksoy, A., Beverinotti, J., Covarrubias, K. &Zezza, A. (2009). Household Income Structures in Low Income Countries. Agriculture and Economic Development Division, Food and Agriculture Organization (FAO), Rome, Italy, Pp 102.

Ali, M., Egbetokun, A. & Memon, M. H. (2018). Human Capital, Social Capabilities and Economic Growth. *Economies,* 6 (2), 1 – 18.

Amogne A. Belay S., Ali, H.& Amare B. (2017). Determinants of non-farm livelihood diversification: evidence from rain-fed-dependent smallholder farmers in North Central Ethiopia (Woleka sub-basin), *Development Studies Research,* 4 (1), 22-36

Aniedu, O. C. (2016). Socio-economic factors influencing adoption of improved Yam production technologies in Abia State, Nigeria. *Advances in Applied Science Research,* 27(4), 66-70.

Anriquez, G. &Bonomi, G. (2007). Long-Term Farming Trends. An Inquiry Using Agricultural Censuses. FAO ESA Working Paper No. 07-20, 07-5 FAO, Rome.

Asfaw, A., Simane, B., Hassen, A. & Bantider, A. (2017). Determinants of non-farm livelihood diversification: evidence from rain-fed-dependent smallholder farmers in North Central Ethiopia (Woleka Sub-basin). *Development Studies Research,* 4 (1), 22 – 36.

Asmah, E. E. (2011). Rural Livelihood Diversification and Agricultural Household Welfare in Ghana. *Journal of Development and Agricultural Economics,* 3 (7), 325–334.

Assan, J. K. &Beyene F. R. (2013). Livelihood impacts of environmental conservation programmes in the Amhara Region of Ethiopia. *Journal of Sustainable Development,* 6(10), 87 – 105.

Awoniyi, A. O. &Salman, K. K. (2011). Non-farm Income Diversification and Welfare Status of Rural Households in South West Zone of Nigeria. Agricultural productivity and food security in Africa conference held at Addis Ababa, November 1st – 3rd, 23 – 32.

Ayantoye K., Amao J. O. & Fanifosi G. E. (2017). Determinants of livelihood diversification among rural households in Kwara State, Nigeria. *International Journal of Advance Agricultural Research,* 5(1), 82 – 88.

Ayoade, A. R. & Akintonde, J. O. (2012). Constraints to adoption of agricultural innovations among women farmers in Isokan Local Government Area, Osun State. *International Journal of Humanities and Social Science,* 2(8), 57-61

Babatunde, R. O. & Qaim, M. (2009). Patterns of diversification in rural Nigeria: Determinants and impacts. *Quarterly Journal of International Agriculture*, 48(1), 305 – 320.

Babatunde, R. O., Olorunsanya, E. O. & Adejola, A. D. (2010). Assessment of rural household poverty: Evidence from South-Western Nigeria. *American-Eurasian Journal of Agriculture and Environmental Science,* 3(6), 900 – 905.

Barrett, C. B., Reardon, T. & Webb, P. (2010). Non-farm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics and policy implications. *Food Policy,* 26(4), 315 – 331.

Batool, S., Babar, A., Nasir, F. & Iqbal, Z.S. (2017). Income Diversification of Rural Households in Pakistan. *International Journal of Economic and Management Science,* 6 (6), 466-471.

Becker, G. S. (1975). 'Human capital and the personal distribution of income: an analytical approach', in *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education* (2nd edition). New York: National Bureau of Economic Research

Benjamin, D. (1992). Household composition, labour markets and labour demand: Testing for separation in agricultural household models. *Econometrica*, 60(2), 287 – 322.

Benjamin, C. & Kimhi, A. (2006). Farm work, off-farm work and hired farm labour: Estimating a discrete-choice model of French farm couples' labour decisions. *European Review of Agricultural Economics*, 33(2), 149 – 171.

Benjamin, T. A. & Richard, W. N. Y. (2019). Determinants of off-farm income among smallholder rice farmers in Northern Ghana: Application of a double-hurdle model. *Advances in Agriculture*, 1(1), 1 – 7.

Beyene, A. D. (2008). Determinants of off-farm participation decision of farm households in Ethiopia. *Agrekon: Agricultural Economics Research Policy and Practice in Southern Africa*, 47(1), 140–159.

Bjornsen, H. M. & Mishra, A. (2012). Labour allocation in a household and its impact on production efficiency: A comparison of panel modelling approaches. *Advances in Econometrics*, 29(1), 269 – 303.

Blair, F. (2018). *The Trouble with Human Capital Theory*. Real-World Economics Review. *World Economics Association Bristol*, 86(1), 15 – 32.

Bower, J. L. (2017). Managing resources allocation: Personal reflections from a managerial perspective. *Journal of Management*, 8(2), 21 – 30.

Brown, D. R., Stephens, E. C., Okuro, M. J., Murithi, F.M. & Barrette, C. B. (2006). Livelihood Strategies in the Rural Kenyan Highland, Kenya, 34 – 46.

Bulus, D. (2016). Impact of DEC micro-credit programme on poverty alleviation among women farmers in Kaduna State, Unpublished Ph.D Thesis Submitted to the Department of Agricultural Extension and Rural Sociology, Federal University of Technology, Minna, 1 – 163.

Chambers, R. & Conway, R. (1992). Sustainable rural livelihoods: Practical concepts for the 21st century. Institute of Development Studies discussion paper 296. Brighton: IDS Publication, 12.

Chekene, M. B. (2015). Factors affecting the adoption of improved rice varieties in Borno State, Nigeria. *Journal of Agricultural Extension*, 19(2), 21-33.

Dadi, W. (2016). Livelihood Diversification as Household Strategies. A Case Study of Rural Kebeles around Gelan Town, Oromia, Ethiopia. Unpublished MA Thesis submitted to the Department of Geography and Environmental Studies, Addis Ababa University, Addis Ababa, Ethiopia.

Daneji, M. I. (2011). Agricultural Development Intervention Programmes in Nigeria (1960 to Date): A Review, *Savannah Journal of Agriculture*, 6(1), 102-106.

Daudu, A.K., Matanmi, B.M., Komolafe, S.E. &Ajibola, B.O. (2014). Perceived benefits of National Fadama Development Project III among rural farmers in Kwara State, Nigeria. *Journal Agriculture Resource and Development,* 13(2), 56 – 68.

Davis, B., Winters, P. &Carletto, G. (2010). A cross-country comparison of rural income generating activities. *Journal of World Development*, 38(1), 48–63.

Davis, B., Giuseppe, S.D. and Zezza, A. (2017). Are African households (not) leaving agriculture? Patterns of households' income sources in rural Sub-Saharan Africa. *Food Policy*, 67(1), 153-174.

De Janvry, A., Sadoulet, E. & Zhu, N. (2005). The Role of Nonfarm Incomes in Reducing Rural Poverty and Inequality in China. CUDARE Working Paper No. 1001. UC Berkeley Department of Agricultural and Resource Economics, UCB. http://escholarship.org/uc/item/7ts2z766

De Muro, P. & Tridico, P. (2008). The Role of Institutions for Human Development.

Djurfeldt, A. & Djurfeldt, G. (2013). Structural Transformation and African Smallholders: Drivers of Mobility within and between the Farm and Non-farm Sectors for Eight Countries. *Oxford Development Studies,* 41(3), 281 – 306.

Drinkwater, M. (1998). Participatory livelihood assessments. Johannesburg Southern and West Africa Regional Management Unit, CARE, South Africa, 27.

Ellis, F. (2010): The Determinants of Rural Livelihood Diversification in Developing Countries. *Journal of Agricultural Economics*, 51(2), 289 – 302.

El-Osta, H. S., Mishra, A. K. &Morehart, M. J. (2011). Off-farm labour participation decisions of married farm couples and the role of Government payments. *Review of Agricultural Economics,* 30(1), 311 – 332.

Etuk, E. A., Udoe, P. O. & Okon, I. I. (2018). Determinants of livelihood diversification among Farm Households in Akamkpa Local Government Area, Cross River State, Nigeria, *Agrosearch,* 18(2), 101 – 112.

Ewebiyi, I. O. & Meliudu, N.T. (2013). Constraints to livelihood diversification among rural households in South-Western Nigeria. *Journal of Agricultural Extension*, 9(1), 13-22.

Frank, R. H.& Bernanke, B. S. (2007). *Principles of Microeconomics.* New York: McGraw-Hill/Irwin.

Frisvold, G. B. (1994). Does supervision matter? Some hypothesis tests using Indian farm level data. *Journal of Development Economics,* 432), 217 – 238.

Greene, W. (2003). *Econometric Analysis*. New Jersey: Prentice Hall.

Haggblade, S. P., Hazell, B. R. & Thomas, R. (2007). *Transforming the Rural Non-farm Economy: Opportunities and Threats in the Developing World*. Baltimore: The Johns Hopkins University Press.

Ifeanyi-obi, C. C. & Mathews-Njoku, E. C. (2014). Socio-economic factors affecting choice of livelihood activities among rural dwellers in Southeast Nigeria. *Journal of agriculture and veterinary science*, 1(1), 52 – 56.

International Labour Organization (2003). Household income and Expenditure Statistics. Prepared for the Seventeenth International Conference of Labour Statisticians, ILO, Geneva, 1 – 20.

Iyanda, J. O., Afolami, C. A., Obayelu, A. E. & Ladebo, O. J. (2014). Social Capital and Access to Credit among Cassava Farming Households in Ogun State, Nigeria. *Journal of Agriculture and Environmental Sciences*, 3(2), 175 – 196.

Kamil, S., Sevin, U. & Festus, V. B. (2017). The contribution of agricultural sector on economic growth of Nigeria. *International Journal of Economics and Financial Issues*, 7(1), 547 – 552.

Kaya, M. V. & Tigli, A. (2016). Wage theories and an applicable wage model proposal for Turkey's labour market. *Journal of the Faculty of Economics and Administrative Sciences,* 6(1), 501 – 523.

Khatun, D. & Roy, B. C. (2012). Rural livelihood diversification in West Bengal: Determinants and constraints. *Agricultural Economics Research Review,* 25(1), 115 – 124.

Kijima, Y., Matsumoto, T. & Yamano, T. (2006). Non-farm employment, agricultural shocks and poverty dynamics: Evidence from Rural Uganda. *Agricultural Economics*, 35(1), 459–467.

Kwon, D. (2009). Human Capital and Its Measurement. The 3rd OECD World Forum on Statistics, Knowledge and Policy: Charting Progress, Building Vision and Improving Life held at Busan, Korea from 27th – 30th, October, 1 – 15.

Loison, S. A. (2015). Rural Livelihood Diversification in Sub-Saharan Africa: A Literature Review. *The Journal of Development Studies*, 51(9), 1125–1138.

Loison, S. A. & Bignebat, C. (2017). Patterns and Determinants of Household Income Diversification in Rural Senegal and Kenya. *Journal of Poverty Alleviation and International Development,* 1(1), 93 – 126.

McKay, A. (2010). Should the Survey Measure Total Household Income? in: *Designing Household Survey Questionnaires for Developing Countries:* Lessons from Fifteen Years of Living Standard Measurement Study, Grosh, M. & Glewwe, P. (Eds.), The World Bank, 83 – 104.

Mengistie, D. & Kidane, D. (2016). Assessment of the impact of small-scale irrigation on household livelihood improvement at Gubalafto District, North-Wollo, Ethiopia. *Agriculture,* 6(1), 27 – 34.

Mohammed, U., Umar, I. S., Saliu, I. T., Tsado, J. H. & Pelemo, J. J. (2020). Analysis of Livelihood Benefits Derived from Forest Resources Utilization among Farming Populace in Kogi and Niger States, Nigeria, *Journal of Agripreneurship and Sustainable Development*, 3(3), 47-50

Mishra, A. K. & Sandretto, C. L. (2002). Stability of farm income and role of non-farm income in UaS agriculture. *Review of Agricultural Economics,* 24(1), 208 – 221.

Mtocha, I. M. (2015). Non-farm Income: The Struggles of the Rural Poor in Malawi. Unpublished Master Thesis submitted to the Department of Agrarian Food and Environmental Studies, University of Hague, Netherlands, 1 – 61.

Muhammed, Y. (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.

Myyra, S., Pietola, K. & Jauhiainen, L. (2011). Systemic yield risk and special index correlations: Relevant market area for index-based contracts. *Food Economics,* 8(2), 114 – 125.

Nagler, P. & Naudé, W. (2017). Non-farm entrepreneurship in rural sub-Saharan Africa: New empirical evidence. *Food Policy*, 67(1), 175–191.

National Bureau of Statistics (NBS) (2021). Nigerian Gross Domestic Product Report. Abuja, Nigeria, 89.

National Population Commission (NPC) (2006). The Population Census Report. Lagos State, Federal Republic of Nigeria.

Niger State Agricultural Mechanization and Development Authority (NAMDA) (2018). National Farmers Data Base, Niger State, Nigeria.

Niger State Geographic Information System (NSGIS) (2015). Background information. Retrieved from www.nigergis.com/about_niger_state on the 20th March, 2017.

Nse-Nelson, F. A., Igwe, K. C. & Iroadighiogu, M. (2016). Income diversification for reducing rural poverty among farm households in Umuahia North Local Government Area of Abia State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment,*12(3), 169 – 174.

Nuga, B. O. & Asimiea, A. O. (2015). SWOT Analysis of the Nigeria Agricultural Sector. *Journal of Agriculture and Veterinary Science,* 8(4), 51 – 53.

Nwaru, J. C. & Ekumankama, O. O. (2012). Economics of Resource Use by Women Arable Crop Farms in Abia State. Unpublished Research Report Submitted to the Senate Grant Committee, Michael Okpara University of Agriculture, Umudike, December.

Obinna, L. O. & Onu, S. E. (2017). Contributions of Rural Women Entrepreneurs in Non–Farm and Off–Farm Enterprises of Households Poverty Reduction in Abia State. *Journal of Agricultural Extension,* 21(3), 143-151.

Odoh, N. E. & Nwibo, S. U (2017). Socio-Economic Determinants of Rural Non-Farm Households Income Diversification in Southeast Nigeria, *International Research Journal of Finance and Economics,* 1(164), 1-13

Odozi, J. C., Ikhimalo, O. P., Awaebe, J. & Agbugui, M. (2018). *Employment in the Nigerian Agricultural Labour Market: Barriers and Forecast.*

Ogbanje, E. C., Chidebelu, S. A. N. D. & Nweze, N. J. (2015). An Evaluation of Off-farm Work and Household Income among Small-scale Farmers in North Central Nigeria. *Journal of Agriculture and Sustainability*, 7(2), 227 – 244.

Ojumu, B. (2016). *Wage Determination. Classwork Series and Exercises*. Lagos, Nigeria: Technology Transforming Education Publication.

Olatona, M. O. (2007). Agricultural Production and Farmers‟ Income in Afon District, Unpublished BSc Project, Department of Geography, University of Ilorin, Kwara State.

Olawepo, R. A. (2010). Determining rural farmers' income: A rural Nigeria experience. *Journal of African Studies and Development*, 2(4), 99 – 108.

Olayemi, J. K. (2011). A Survey of Approaches to Poverty Alleviation. A Paper Presented at NCEMA National Workshop on Integration of Poverty Alleviation Strategies into Plans and Programmes, Ibadan, Nigeria.

Olugbire, O. O., Falusi, A. O., Adeoti, A. I. & Oyekale, A. S. (2011). Non-farm income diversification and poverty reduction in Nigeria: A Propensity Score Matching Analysis. *Agricultural Science*, 5(3), 21– 28.

Olughu, K. C. (2019). The Effect of Anchor Borrowers Programme on the Livelihood of Smallholder Rice Farmers in Kaduna State, Nigeria. An Unpublished MTECH Thesis submitted to the Department of Agricultural Extension and Rural Development, Federal University of Technology, Minna, Niger State.

Oluwatayo, I. B. (2009). Explaining inequality and welfare status of households in rural Nigeria: Evidence from Ekiti State. *Humanity and Social Sciences Journal*, 3(1), 70 - 80.

Onakuse, S. & Eamon, L. (2008). Community-Based Organizations Approach: Household food and livelihood security in southern Nigeria. Joint International Conference on Globalization: Migration, Citizenship and Identity held at University of Ibadan, Nigeria, 6th November, 10 – 12.

Ovwigho, B. O. (2014). Factors influencing involvement in non-farm income generating activities among local farmers: The case of Ughelli South Local Government Area of Delta State, Nigeria. *Journal of Sustainable Agriculture Research*, 3(1), 76 – 84.

Oyediran, B. O. (2016). Resource Productivity and Poverty Status of Rice Farmers under the Growth Enhancement and Support Scheme in Agricultural Zone I, Niger State, Nigeria. An MTECH Thesis submitted to the Department of Agricultural Economics and Extension Technology, Federal University of Technology, Minna, Niger State.

Pallant, J. (2005). *SPSS survival manual: a step by step guide to data analysis using SPSS for Windows (Version 12).* Open University Press.

Reardon, T. & Vosti, S. A. (2006). Links between rural poverty and environment in developing countries: Asset categories and investment poverty. *World Development*, 23(9), 1495 – 1506

Sallawu, H., Tanko, L., Coker, A. A. A. & Sadiq, M. S. (2016). Livelihood and income diversification strategies among rural farm households in Niger State, Nigeria. *Asian Journal of Agricultural Extension, Economics and Sociology*, 11(4), 1 – 11.

Senadza, B. (2014). Income diversification strategies among rural households in developing countries. *African Journal of Economic and Management Studies*, 5, 75 – 92.

Sharma, R. (2010). Diversification in Rural Livelihood Strategies: A Macro-Level Evidence from Jammu and Kashmir. Working Papers 439, 42.

Shehu, A. & Abubakar, N. (2015). Determinants of participation of farm households in non-farm enterprise activities in rural Nigeria. *International Journal of Economics, Commerce and Management*, 3(6), 57 – 71.

Shuaibu, M. & Oladayo, P. T. (2016). Determinants of Human Capital Development in Africa: A Panel Data Analysis. *Quarterly Journal of Oeconomia Copernicana*, 7(4), 523 – 549.

Sidi, S. H., Abubakar, B. Z. & Ango, A. K. (2017). Assessment of the effect of Growth Enhancement Support Scheme (GESS) on the output of dry season rice farmers before and after scheme participation in Sokoto state, Nigeria. *Journal of Environment, Agriculture and Biotechnology*, 2(5), 1878 – 2456.

Sisay, B. (2013). Review on rural livelihood diversification among the smallholder farmers in some Africa countries. *International Journal of Agricultural Economics Extension and Rural Development*, 1(1), 010 – 016.

Skoufias, E. (1996). Using shadow wages to estimate labour supply of agricultural households. *American Journal of Agricultural Economics*, 76(2), 215 – 227.

Tenaw, Z. (2016). Constraints of pastoral and agro-pastoral livelihood diversification in Eastern Ethiopia: The case of Mieso District, Oromia Regional State. *International Journal of Sciences Basic and Applied Research*, 26(3), 267 – 274.

Tocco, B., Davidova, S. & Bailey, A. (2012). Key issues in Agricultural Labour Market: A Review of Major Studies and Project Reports on Agriculture and Rural Labour Markets. Factor Markets Working Paper No 20, 1 – 41.

United States Agency for International Development (USAID) (2015). Fiscal Year 2010 Annual Report. Washington D.C., USA.

Van den berg, M. & Kumbi, G. E. (2006). Poverty and rural non-farm economy in Oromia, Ethiopia. *Agricultural Economics*, 35(3), 469 – 475.

Viaggi, D. (2017). Analyzing behavioural differences of farm households: An example of income diversification strategies based on European farm survey data. *Land Use Policy*, 62(1), 172 – 184.

Wallenius, J. & Prescott, E. C. (2011). Aggregate Labour Supply. Federal Reserve Bank of Minneapolis, Research Department Staff Report 457, 1 – 25.

Wilson, R. A. & Briscoe, G. (2004). The Impact of Human on Economic Growth: A Review. In: P. Descy & M. Tessaring (Eds.), *Impact of Education and Training*, Cedefop References Series 54, 1 – 64.

Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quinones, E. J., Zezza, A., Azzarri, C. & Stamoulis, K. (2009). Assets, activities and rural income generation: Evidence from a multi-country analysis. *World Development*, 37(9), 1435 – 1452.

World Bank (2007). World Development Report. Agriculture for Development United States of America, *Monthly Report*, 2, 7 – 9.

Yakubu, B., Bulama, S. M. & James, H. L. (2015). Off-farm activities and its contribution to household income in Hawul Local Government Area, Borno State, Nigeria. *Journal of Agriculture and Veterinary Science*, 8(10), 09 – 13.

Yamane, T. (1967). *Statistics: An Introductory Analysis*, (3rd ed.). New York: Harper and Row.

Yebisi, E. T. (2014). The Nigerian Co-operative Societies Act, 2004: A Bridge still far. Asian. *Journal of Humanities and Social Sciences*, 2(2), 38-49.

Zhao, J. & Barry, P. (2013). Implications of different income diversification indexes: the case of rural China. *Economics and Business Letters*, 2(1), 13 – 20.

APPENDIX A

DEPARTMENT OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT,
SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY,
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGER STATE

RESEARCH QUESTIONNAIRE

Dear respondent,

I am postgraduate student of the above named institution conducting research on ***"Effect of off-farm income diversification on livelihood of small-scale crop farmers in Niger State, Nigeria.***Please kindly fill in the questionnaire and tick (√)as appropriate. All information provided will be treated with sense of maturity, strict confidentiality and for the research purpose only. I hereby solicit for your support and co-operation.

Thank you in anticipation.

YAHAYA, Jamila
MTECH/SAAT/2017/7473
08160337478

Name of LGA:……..……..
Name of Village:……..
Questionnaire No:……

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS OF RESPONDENTS

1.What is your age?.....

2. Gender: (a) Male () (b)Female ()

3. Marital status:

(a) Married ( ) (b) Single ( ) (c) Widow / Widower ( ) (d) Divorced ( )

4. What is your household size? .....

5. What is your educational status?

(a) Formal ( ) (b) Primary ( ) (c) Secondary ( ) (d) Tertiary ( ) (e) Non-formal ( )

i. If Formal, how many years did you spend? .....

ii. If Non-formal, how many years did you spend? .....……

6. How many years have you been involved in crop farming? .....……..

7. What is the size of your farm? ……

8. Kindly indicate the crops you grown last cropping season.

……..……
…

……
….

9. Do you have access to farmland? (a) Yes ( ) (b) No ( )

10. If yes, how did you acquire your farmland?

(a) Gift ( ) (b) Inheritance ( ) (c) Purchase ( ) (e) Rent ( )

i. If purchased, how much is the cost in naira? ₦…….

ii. If rented, how much do you pay for rentage in naira? ₦….....

11. Do you have access to production inputs? (a) Yes ( ) (b) No ( )

12. How do you source for your inputs?

(a) Extension contact ( ) (b) Purchase from market ( ) (c) ADP ( ) (d) Family & Friends ( )

i. If purchase, how much per kg in naira? ₦…….…….

13. What labour type do you use in your farming activities?

(a) Family ( ) (b) Hired ( ) (c) Both ( )

14. Do you have contact with Extension Agent? (a) Yes ( ) (b) No ( )

15. If yes, indicate number of visit by the extension agent (s).

(a) Weekly ( ) (b) Bi-weekly ( ) (c) Monthly ( ) (d) Quarterly ( ) (e) Annually ( )

16. Do you have access to credit? (a) Yes ( ) (b) No ( )

i. If yes, how much? ₦……....

ii. If yes, what is the source of your credit?

(a) Agricultural bank ( ) (b) Commercial banks ( ) (c) Family & Friends ()

(d) Cooperatives ( ) (e) Others (specify)……

17. Do you belong to cooperative society? (a) Yes ( ) (b) No ( )

i. If yes, how many cooperative society do you belong to?.....

(a) One ( ) (b) Two ( ) (c) Three ( ) (d) > Three ( )

ii. If yes, how many years have you been in the cooperative? ……

SECTION B: OFF-FARM DIVERSIFICATION OF THE RESPONDENTS

18. Kindly indicate which of the following off-farm income activities you are engaged in and the amount realized per month.

Off-farm activity	**Tick**	**Amount (₦)**
Marketing		
Petty trading		
Tailoring		
Plumbing		
Motorcycle riding		
Driving		
Carpentry		
Civil service		
Building/bricklaying		
Weaving		
Knitting		

Sales of herbs/local medicines		
Market middlemen		
Mechanic/electrician		
Repairs (bicycle/watches,..etc)		
Blacksmithing		
Handcraft		
Others (specify)		

SECTION C: LIVELIHOOD INDICATORS OF THE RESPONDENTS

19. Kindly indicate which of the following household assets you own.

Asset	**Number**	**Price per unit (₦)**	**Total value (₦)**
Land			
Furniture			
House			
Car			
Motorcycle			
Video			
Television			
Radio			
Others (specify)……..			

20. Kindly indicate which of the following livestock you own.

Animal	**Number**	**Price per unit (₦)**	**Total value (₦)**
Cow			
Bull / Oxen			
Sheep			
Goat			
Poultry as			
Local chicken			
Broiler			
Cocks / Cockerel			
Turkey			
Pigeon			
Ducks			
Guinea fowl			
Donkeys			
Horses			
Dogs			
Swine			
Others (specify)…..			

21. Kindly indicate which of the following production assets you own.

S/NO	Asset Owned	Number	Price per unit (₦)	Total value (₦)
1	Matches			
2	Cutlasses			
3	Hoes			
4	Oxen/Work bulls			
5	Water pump			
6	Motor cycle			
7	OX cart			
8	Milling machine			
9	Hunting traps			
10	Fishing smoking kilns			
11	Fishing gear			
12	Fish Pond			
13	Tube well			
14	Grinding Machine			
15	Others (specify)…….			

22. Kindly indicate the benefits you derived from off-farm income activities

S/No	Benefits	Tick
1	Increased personal income	( )
2	Enhanced household food security	( )
3	Safe guard against risk	( )
4	Engaged in work all year round	( )
5	Improved standard of living	( )
6	Enhanced social networking	( )
7	Increased agro-processing output	( )
8	Enhanced competence and self-reliance	( )
9	Enhanced social status	( )
10	Improved livelihood opportunities	( )

23. If others (specify)

……..……

SECTION D: CONSTRAINTS ASSOCIATED WITH OFF-FARM INCOME DIVERSIFICATION

24. Which of the following are your constraint(s) to livelihood/income diversification?

S/No.	**Constraints**	**VSC**	**SC**	**UN**	**NSC**	**NC**
1	Inadequate capital	( )	( )	( )	( )	( )
2	Lack of entrepreneurial skills	( )	( )	( )	( )	( )
3	Small market size in the rural area	( )	( )	( )	( )	( )
4	Poor marketing facilities in the rural areas	( )	( )	( )	( )	( )
5	Poor infrastructure (markets, roads etc.)	( )	( )	( )	( )	( )
6	Lack of appropriate technologies	( )	( )	( )	( )	( )
7	Unavailabity of government support projects	( )	( )	( )	( )	( )
8	Climatic risk & uncertainty	( )	( )	( )	( )	( )
9	Poor access to credit	( )	( )	( )	( )	( )
10	Norms & religious values	( )	( )	( )	( )	( )
11	No enough time to pursue diversification strategies	( )	( )	( )	( )	( )
12	Inadequate capacity building/training	( )	( )	( )	( )	( )
13	Poor exposure to various opportunities	( )	( )	( )	( )	( )
14	Problem of illiteracy	( )	( )	( )	( )	( )
15	Inability to take risk	( )	( )	( )	( )	( )

Note: VSC=Very Serious Constraints (5), SC=Serious Constraints (4), UN=Undecided (3), NSC=Not Serious Constraint (2), Not a Constraint (1).

25. If others (specify) ……