

**ANALYSIS OF LIVELIHOOD DIVERSIFICATION BY FARMING
HOUSEHOLDS IN SELECTED LOCAL GOVERNMENT AREAS OF KADUNA
STATE, NIGERIA**

BY

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DECLARATION

I hereby declare that this dissertation titled “**Analysis of Livelihood Diversification by Farming Households in Selected Local Government Areas of Kaduna State, Nigeria**” has been written by me and it is a record of my research work. No part of this work has been presented in any previous application for another Degree or Diploma in this or any other institution. All borrowed information have been duly acknowledged in the text and a list of references provided.

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CERTIFICATION

This dissertation titled ‘**Analysis of Livelihood Diversification by Farming Households In Selected Local Government Areas of Kaduna State, Nigeria**’, by Aminu IsaacDAVID meets the regulations governing the award of the Degree of Master of Science, Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to Almighty God.

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ABSTRACT

This study focused on analysis of livelihood diversification by farming households in Kachia, Kagarko and Jaba Local Government areas of Kaduna State, Nigeria. Primary data were collected from 220 respondents using structured questionnaire. The statistical tools used to analyse the data were descriptive statistics, logit regression and t-statistics. The result of the analysis shows that the average age of the farming households were 44 years with an average household size of 7 persons. Majority (64%) of the respondents were not literate. The respondent had an average farming experience of 18 years. About 90% of the respondents do not have access to credit; the respondents had an average farm size of 1 hectare. However, 85% of the farmers do not belong to any cooperative association while about half 50% of the respondents had no other source of income. The result of this study also shows that all the households derived income from farming which in average account for 60.6% of the total household income. Crop production provides about 51.3% of total income. More than half of the household derived income livestock enterprises which however account for only 9.3% of total income. The estimated coefficients of the Logit model, along with the standard error, t-values and marginal effect are presented. The likelihood ratio test was 63.259 with 6 degree of freedom is significant at ($p \leq 0.01$). The t-test indicated that there was significant difference between output, income and level of living of household that are involved in livelihood diversification and non-diversifying household. The result shows that the output, income and level of living had significance on the household that are involved in livelihood diversification at $p < 0.05$ level of probability. Lastly, among the major constraints to livelihood diversification in the study area were: lack of credit facilities, poor asset base, lack of awareness and training facilities, fear of taking risk and lack of opportunities in non-farm sector. It could be concluded that engagement in off-farm income generation activities decreases with farming experience while it increases with male-headed household, education, credit and market. It is recommended that the monetary authority in collaboration with the government should promote non-farm employment by ensuring farmers access to credit.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agriculture has been an important sector in the Nigerian economy in the past decades and is still a major sector despite the oil boom. Basically it provides employment opportunities for the teeming population, eradicates poverty and contributes to the growth of the economy. Despite these however, the sector is thus characterized by low yields, low level of inputs and limited areas under cultivation (Izuchukwu, 2011). It involves small scale farmers scattered over wide expanse of land area, with small holding ranging from 0.5 to 3.0 hectare per farm land. It is characterized by rudimentary farm systems, low capitalization and low yield per hectare (Kolawale and Ojo, 2007). The roles of agriculture remain significant in the Nigeria economy despite the strategic importance of the oil sector. Agriculture provides primary means of employment for Nigeria and accounts for more than one third of total Gross Domestic Product (GDP) and labour force (Ismaila *et al.*, 2010).

The Contribution of agriculture to Nigeria's Gross Domestic Product (GDP), which stood at an average of 56% in 1960-1964 decline to 47% in 1965-1969 and further declined to 35% in 2002-2004 and with crop production accounting for an estimated 85% of this total, the agricultural sector provides a livelihood for the bulk of the rural population (Amaza and Maurice, 2005); Provides up to 70% active labour force (Bello, 2004; Ayinde, 2008), supplies raw materials required by the industrial sector and generate foreign exchange through export. In spite of this, agricultural production has failed to meet the food needs of the country's rapid growing population (Ayinde, 2008).

In Africa, various studies have shown that while most rural households are involved in agricultural activities such as livestock, crop or fish production as their main source of livelihood, they also engage in other income generating activities to augment their main source of income. A majority of rural producers have historically diversified their productive activities to encompass a range of other productive areas. In other words, very few of them collect all their income from only one source, hold all their wealth in the form of any single asset, or use their resources in just one activity (Barrett *et al.*, 2001).

In Nigeria, the agricultural sector is plagued with problems which include soil infertility, infrastructural inadequacy, risk and uncertainty and seasonality among others. Thus, rural households are forced to develop strategies to cope with increasing vulnerability associated with agricultural production through diversification, intensification and migration or moving out of farming (Ellis, 2000). In other words, the situation in the rural areas has negative welfare implications and predisposes the rural populace to various risks which threaten their livelihoods and their existence. As a result of this, they struggle to survive and in order to improve their welfare, off-farm and non-farm activities have become an important component of livelihood strategies among rural households in Nigeria.

1.2 Problem Statement

Nigeria has a huge agricultural endowment; hunger characterizes the majority of the population. About 64.4% and 83.7% of the population live below the poverty line of US\$1.25 and US\$2 per person per day, respectively (Aye, 2013). Nigeria faces a lot of challenges including that of attaining food security, which is one of the millennium

development goals (FAO, 2003). Some of these challenges are caused by natural resources (soil, water and climate), faulty micro economies, agricultural policies, bad economy. Due to these challenges, smallholder farmers in Nigeria are poverty stricken. These challenges affect individual farmers and put the household welfare of the farmer at danger or at risk. Consequently, this risk encourages farmers to diversify into other non-farm activities which are expected to supplement their income.

Thus, rural households are forced to develop strategies to cope with increasing vulnerability associated with agricultural production through diversification, intensification and migration or moving out of farming (Ellis, 2000). In other words, the situation in the rural areas has negative welfare implications and predisposes the rural populace to various risks which threaten their livelihoods and their existence. As a result of this, they struggle to survive and in order to improve their welfare, off-farm and non-farm activities have become an important component of livelihood strategies among rural households in Nigeria.

The need to study the livelihood of rural farmers becomes paramount. The rural livelihood diversification from farming is one of the rural households' strategies for survival in developing countries like Nigeria (Ellis, 2009). The rural people diversify into non-farm activities to explore opportunities through which they increase and stabilize their incomes or to supplement farming in order to improve the welfare or living standard of their households. In Kaduna State as well, rural households diversify or engage in other income generating activities as a way of avoiding risk from agricultural disasters or failure, some households diversify into other agricultural sectors/farming strategies while others diversify into non-farm activities like tailoring, crafts and skills like knitting,

plaiting of hair/barbing, others engage in civil service jobs. Information on the impact of diversification and factors influencing the decision of household to diversify in the study area is scanty. It's against this backdrop; the study came up with following research questions.

- i. What are the socio-economic characteristics of farming household in the study area?
- ii. What are the livelihoods activities (farm and non-farm activities) engaged in by the farmers?
- iii. What are the factors that affect the decision of farm households to diversify?
- iv. What are the impact of diversification on household output, income and level of living?
- v. What are the constraints mitigating the farming household to diversify?

1.3 Objectives of the Study

The broad objective of this study was to analyze the livelihood diversification pursued by farming households in Kachia, Kagarko and Jaba Local Government areas. The specific objectives were to;

- i. describe the socio-economic characteristics of farming household in the study area;
- ii. describe the livelihoods activities engaged in by the farming household;
- iii. determine the factors influencing farming household to diversify;
- iv. determine the impact of diversification on household output, income and standard of living; and

- v. describe the constraints mitigating the farming household to diversify in the study area.

1.4 Justification for the Study

Livelihood diversification pursued by farming households is the single most important source of poverty reduction for small farmers in West Africa and South East Asia (FAO and World Bank, 2011). As a result of various forms of deprivation of basic amenities of life, like the substandard health care facilities, absence of potable water, prevalence of poor sanitation, low level of literacy, diseases, etc., the productivity of most households is reduced and their ability to utilize food to their maximum benefit is hampered. The resultant effect of these problems being faced by these households is that most of them are not having enough to feed on, the year round.

An understanding of the significance and nature of non-farm and off-farm activities (especially its contribution to rural household income or resilience) is of utmost importance for policy makers in the design of potent agricultural and rural development policies. Further, the rising incidence of low level of welfare of rural households in Nigeria, that remains unabated despite various policy reforms undertaken in the country, requires a deeper understanding of the problem and the need to proffer solutions to the problem through approaches that place priority on the poor and ways on which rural households through diversification can maintain their livelihood. Similarly, the study will be useful to the government of Kaduna state, as a basis for rational and empirical policy formulation for farmers in the State.

1.5 Hypothesis

- i. There is no significant difference between the output of diversified household and non-diversified household.
- ii. There is no significant difference between the income of diversified household and non-diversified household.
- iii. There is no significant difference between the level of living of diversified household and non-diversified household.

CHAPTER TWO

LITERATURE REVIEW

2.1 Socio-Economic Characteristics of Farmers

Socio-economic characteristics play significant role in the farmers' lives in the sense that they influence willingness to accept changes which contributed significantly in raising farm productivity and ultimately their standard of living. 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, member of cooperative, extension contact and other estimated economic variables like income, output and standard of living. Sharma *et al.* (2003) reported that all male-headed with an average family size did not vary significantly across the regions where the study was conducted. Likewise, average age of household heads was above 40 years. However, average age of commercial farmers was lower compared to other farm size categories which indicate that younger farmers have strong preference for production activity.

According to Emmanuel *et al.* (2006) farmers participating in irrigation project had some type of formal education and not all of them do not have formal education. In survey of pigeon pea production systems utilization and marketing in semi-arid lands of Kenya, the average age of farmers in both locations was 46.5 years with over 40% having attended at least 4 years school with an average family size of 9 people (Mergeai *et al.*, 2001). Muhammed-Lawal *et al.* (2009) also reported that 82.73% of the youth in agriculture are male. Chikezie *et al.* (2012) revealed in his findings of factors mitigating rural youth involvement in cassava production that majority of the youths in Onu-Imo Local Government Area of Imo State were at the productive age where their energies could be harnessed and utilized for productive venture in agriculture especially cassava

production. From his findings 9.17% of the respondents were below 20 years, 43.33% and 33.33% were between 21–25 years and 26–30 years, respectively, while only 14.17% of the respondents were more than 30 years of age. He also revealed that 81.67% of the respondents were male, while 18.33% were female. According to Adewale *et al.* (2005) gender is not a barrier to active involvement in cassava production activities.

One major characteristic of small-scale farmers is fragmented land holding. Their results show that 63.33% of the respondents cultivated less than one hectare, while 33.33% and 3.34% farmed on between 1 - 2 hectares and more than two hectares respectively. According to Nsoanya and Nenna (2011) who observed in their study that majority (60%) of farmers were aged between 31 – 40 years, with a mean average age of 37.5, indicating that the cassava producers were relatively young. The findings revealed that majority (85%) were females while only few (15%) were males. This shows that women play a significant role in the production of cassava in the area even though they are not allowed to own lands especially by inheritance for cultural reasons. This findings supports that of Adisa and Okunade (2005) and Akinngbe *et al.* (2008) who asserted that women are the backbone of Agricultural sector, and are responsible for 80% of food production. A recent study on gender and cassava commercialization in Nigeria showed that as cassava is commercialized households in cassava producing areas invest more on the education of their children (Kormawa and Asumugha, 2003).

Chikaire *et al.* (2011) in their study on “Land-holding inequality among Smallholder Farmers in Imo State, Nigeria” found that greater degrees of inequality in land holding exist in the study area. This is as a result of differences in access to farm land. Farm land ownership structure shows wide variations in the size of holdings in the study area.

Majority of holdings however, tend to be in small sizes. The distribution of farms by size of holdings in the study area shows that majority falls within 0.25 - 2 hectare. Data from the field revealed that among these groups are the widows who acquired land by rent especially, farmers with small family size and new entrants in farming business.

2.2 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 windfall gains and other such 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 (1985) 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 (2001) 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 of 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. Even though measuring household well-being is still considered one of the key reasons to collect income data, other purposes are often more important, such as utilizing income data as an input into the analysis of the determinants of welfare 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, 2000).

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).

2.3 The Concept of Livelihood

The term livelihood attempts to capture not just what people do in order to make living, but the resources that provide them with capability to build a satisfactory living, the factor they must consider in managing their resources, the institutional and policy context that either helps or hinders their pursuit of an improved living. Wikipedia defined livelihood as a set of economic activities involving self-employment, and or wage employment by using one's endowments (both human and maternal) to generate adequate resources for meeting the requirements of self and the household on a suitable basis with dignity (Porter *et al.*, 2007). The activity is usually carried out repeatedly for instance; a fisherman's livelihood depends on the availability and accessibility of fish. The nature of these livelihood activities depends on the availability of assets, resources (including climate), labour, skills, education, social capital, seasonality, agro-climate/agro-ecology, and gender (Pasteur, 2002; Ali, 2005; Okali, 2006; Porter *et al.*, 2007; Ogunlela and Mukthar, 2009; Akinwale, 2010).

Frankenberg and McKesson (1998) viewed the concept of livelihood as the sustainable access to resources to meet basic needs including adequate access to food, portable water, health facilities, educational opportunities, housing, time for community participation and social integration. Dekker (2002) asserted that the current livelihood studies have concentrated on the actions and strategies of people trying to make a living

in adverse circumstances such as economic and political adversity. He further Stated that he concept of livelihood is used mostly to address the issue of poverty that aims to be people oriented, non-sectional and grounded in multidimensional reality on daily life. This livelihood, according to Rahman *et al.* (2007) is broader than income; it includes everything done to obtain a living from his forgoing rural livelihood could be explained as ability of rural households to judiciously utilize resources at their disposal by engaging in activities that enables them make a living.

In essence, livelihood in this respect may be looked at in terms of quality of life, level of living o way of life. Key concepts that repeatedly feature in explaining rural livelihoods are further explained. These include livelihood assets (resources) livelihood activities, livelihood strategies, sustainable livelihoods and livelihood outcomes. Babulo *et al.*(2008) regarded livelihood assets as comprising both human and non-human resources upon which livelihood are built and to which people need access according to Rakodi (1999) livelihood assets constitute a stock or capital that can be stored accumulated exchanged or allocated to activities to generate flow of income or means of livelihood or other benefits.

Livelihood strategies according to Babulo *et al.* (2008) can be regarded as the full portfolio of activities that people undertake in order to achieve their livelihood outcomes and objectives. Ellis (1998) in his own contribution, posited that livelihood strategy does not encompass only activities that generate income but many kind of choices, including cultural and social choices, that come together to make up the primary occupation of a household. Examples of such socio-cultural choices among rural households include migration of male heads of household in pursuit of better

livelihood, reliance on remittances, and pensions by retired members of households and resorting to indecent acts of begging and prostitution.

2.4.1 Strategies of livelihood

Means of livelihood referred to as production strategies which include income-earning activities, remittance, gift and loans. But LS are dynamic and widespread from which rural poor people are able to respond based on changing pressures and local opportunities that could be adapted accordingly (Ellis, 2000).

Livelihood activities on the other hand are sets of actions of activities through which households gain their means of living. Parrot *et al.* (2006) divided livelihood activities into four categories namely:

- Production activities: those activities that produce goods and services that contributes to income (the value of goods and services that are actually or potentially tradable). Production activities involve integrating the classical economic classification of production factors- land, labour, and capital.
- Reproduction activities: these are sometimes called household maintenance activities, and are activities such as child care, cooking and cleaning. These are not generally tradable but are nevertheless essential for the well-being of household members and the reproduction of the conditions through which a family survives.
- Consumption activities: These activities can be seen as satisfying material wants and needs through the provision of items such as food, clothing or medical services etc.

- Exchange activities: relates to the transfer of goods and services or information between individuals. The activities include for example, commercial trade, barter, and gift giving. They do not necessarily involve cash or reciprocity. The exchange of goods and services is very often a significant and dynamic component of rural economies.

2.4.2 Sustainable livelihood

Chambers and Conway (1992) proposed the following composite definition of a sustainable rural livelihood (SL), which is applied most commonly at the household level: A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term. Of the various components of a livelihood, the most complex is the portfolio of assets out of which people construct their living, which includes both tangible assets and resources, and intangible assets such as claims and access.

2.4 Rural Livelihoods and their Natures

A livelihood comprises people, their capabilities, and their means of living, including food, income and assets. Tangible assets are resources and stores, and intangible assets are claims and access. A livelihood is environmentally sustainable when it maintains or enhances the local and global assets on which livelihoods depend. Livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generation (Chambers and Conway, 1992). According to United States Agency

for International Development (2005) livelihood is the sum of ways in which households make ends meet from year to year and how they survive or fail through difficult times. 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, recognizing that the conditions and consumptions change. People's livelihoods change sometime rapidly overtime (Drinkwater, 1998). The concept has gained wide acceptance as a valuable means of understanding the factors that influence people's lives and well-being particularly those of the rural poor (Wanmali, 1999).

Livelihood approaches are way of thinking about the objectives, scope and priorities for development. They place people and their priorities at the center of development. It focuses on poverty reduction interventions on empowering the poor to build on their own opportunities, supporting their access to assets, and developing enabling policy and institutional environment. Core to livelihood approaches are a set of principles that underpin best practice in any development intervention such as people-centred, responsive and participatory, multi-level, conducted in partnership, sustainable and dynamic. According to Ellis (2000) rural livelihoods compose of activities that generate means of household survival and long term well-being. He further stated that livelihood strategies could be divided into; natural resources based activities like (collection and gathering, cultivation, livestock rearing, weaving) and non-natural resources based activities such as (trade, service and remittance).

A focus on changes of sources of livelihood of rural poor and factors affecting these changes may vary depending on location, gender, available natural resources, income generation activities and ethnicity. These factors affects access to assets of production

which include natural resources like land and water for farming activities, labour and human capital, education, skill and health (Onakuse and Eamon, 2008). Similarly, there has been a shift from a material perspective that focuses on the improvement of people's capabilities to ensure their own livelihoods. Greater part of this thinking is derived from the participatory approaches that have become well integrated into the various implementing agencies activities for project diagnosis and design (Singh *et al.*, 2002).

Cleaver (1999) stated that poor livelihood is associated with lack of portable water, electricity, health care facilities, educational and recreational facilities, and unmotorable roads. Others are high population growth rates, high infant and maternal mortality and low life expectancy. International Fund for Agricultural Development (2001) argued that increasing access to assets is crucial for broad-based growth and poverty reduction. There has been lots of government intervention programmes put in place aimed at improving the livelihood of rural people in the country. Therefore, improving the living condition of the poor requires a focus on sectors that would benefit them, for instance, boosting rural economy and distribution system (Igwe, 2005).

2.5 Empirical study on livelihood diversification

A number of studies have been conducted on diversification and household welfare and/or poverty. This section studies that examined this link as well as studies that examined solely the determinants of diversification or non-farm employment. For instance, Kijima, Matsumoto, and Yamano (2006) analyzed the role of off-farm employment in poverty reduction using panel data from 894 rural Ugandan households in 2003 and 2005. Taking advantage of the unique off-farm labor supply and income data, they analyzed how households respond to negative agricultural shocks, especially through off-farm labor 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, Sadoulet, and Zhu (2005) used detailed household survey data from Hubei province in China to simulate the counterfactual of what rural households' incomes, poverty and inequality would be in the absence of access to non-farm sources of income.

Results show that, without non-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 (2010) 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 2008. 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 labor and resources into off-farm activities because of a lower level of asset (Berdegue *et al.* 2000; Corral and Reardon 2001). Warren (2002) found that a

decrease in availability of arable land, an increase in producer/consumer ratio, credit delinquency and environmental deterioration can be important drivers towards diversification.

Olugbire *et al.* (2011) investigated the impact of nonfarm employment (disaggregated by wage- and self-employment) on household income and poverty. Using a propensity score matching model, they evaluated the differences in outcomes between households who participate in the non-farm employment and those who do not. The results from the study show that non-farm wage-employed households have a significantly higher income than self-employed households. Findings also revealed that non-farm wage-employment impacts more on household welfare than non-farm self-employment. The benefits to non-farm wage-employment are much higher among the non-poor than among the poor. Awoniyi and Salman (2011) investigated the level of non-farm income diversification, its effect on welfare status of farming households and factors that determine levels of non-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 non-farming activities live below the poverty line compared with farming households (48.3%) whose household heads are engaged in non-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 non-farm income.

2.6 Empirical study on Logit Regression Model

Logistic regression is used to predict a categorical (usually dichotomous) variable from a set of predictor variables (Wuensch, 2014). With a categorical dependent variable, discriminant function analysis is usually employed if all of the predictors are continuous and nicely distributed; logit analysis is usually employed if all of the predictors are categorical; and logistic regression is often chosen if the predictor variables are a mix of continuous and categorical variables and/or if they are not nicely distributed (logistic regression makes no assumptions about the distributions of the predictor variables) (Wuensch, 2014). For a logistic regression, the predicted dependent variable is a function of the probability that a particular subject will be in one of the categories.

Ebojie *et al.*, (2012) employed Logit model to determine the factors influencing farmers' adoption of hybrid maize in Giwa local government area of Kaduna state, Nigeria. Saka and Lawal (2009), utilized the logit model to determine the factors that influence adoption and productivity of improved rice varieties in southwestern Nigeria. Petros (2011) also employed the logit model to identify the factors that influence adoption of conservation tillage technologies in Metema Woreda, North Gondar zone, Ethiopia. Swagata *et al.* (2008) in a study on factors affecting adoption of GPS guidance systems by Cotton producers made use of a binary logit model. Arellanes and Lee (2003) also employed the logit model in estimating the determinant of adoption of sustainable agriculture technologies from the hillsides of Honduras.

Several farm level empirical studies have amply shown the economic benefits of Bt cotton (Smale, *et al.*, 2006) but its inconsistency and differential performances (Sahai and Rahman, 2003) as well as the risk perception and apprehension among the farmers

about the potential impact on human, cattle and soil due to lack of educational interventions kept the controversy and debate alive. Services from public extension system were non-existent as the technology (Bt cotton seeds) was deployed from private companies and hence the farmers were solely dependent upon seed dealers for information, who unlike public extension system had more vested interest to earn profit by enhancing the sale of seeds than in educating the farmers and solving their problems. Following Maddala (1992), Green (2008) and Gujarati (2004) the logistic distribution for the probability estimation of these factors follows a binary choice model and as such, the model is presented below can be specified as:

$$P_i = \frac{1}{1 + e^{-z_i}} \dots \dots \dots (1)$$

Where, P_i is a probability P is the probability of events occurrence for the i^{th} farmer and ranges from 0 to 1. e represents the base of natural logarithms and Z_i is the function of a vector of n explanatory variables and expressed.

$$Z_i = \beta_0 + \sum \beta_i X_i \dots \dots \dots (2)$$

Where:

β_0 = intercept

β_i = vector of unknown slope coefficients.

The relationship between P_i and X_i , which is non-linear, can be written as follows:

$$P_i = \frac{1}{1 + e^{(\beta_0 + \beta_i X_i + \dots \dots \dots \beta_n)}} \dots \dots \dots (3)$$

The slopes tell how the log-odds in favour of making a choice rather than other as independent variables change. If P_i is the probability of an event occurring, then it is follows that $1 - P_i$ represent the probability of it not occurring and it can be written as:

$$1 - P_i = \frac{1}{1 + e^{-z_i}} = P_i = \frac{e^{z_i}}{1 + e^{-z_i}} = P_i = \frac{1}{1 + e^{z_i}} \dots \dots \dots (4)$$

Dividing equation (1) by equation (4) and simplifying gives:

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{z_i}}{1 + e^{-z_i}} = e^{z_i} \dots \dots \dots (5)$$

Equation (5) indicates simply the odd-ratio in favour of adopting the technologies. It is the ratio of the probability that the farmer will adopt the technology to the probability that he will not adopt it. Finally, the logit model is obtained by taking the logarithm of equation (5) as follows.

$$l_i = \frac{P_i}{1 - P_i} = Z_i = \beta_0 + \beta_1 X_i + \dots \dots \dots + \beta_n X_n \dots \dots \dots (6)$$

Where l_i is log of the odds ratio, which is not only linear in X, but also linear in the parameters: Thus, if the stochastic disturbance term u_i is taken into account, the logistic model becomes:

$$Z_i = \beta_0 + \beta_1 X_i + \dots \dots \dots + \beta_n X_n + u_i \dots \dots \dots (7)$$

This econometric model is estimated using the iterative Maximum Likelihood Estimation (MLE) procedure due to the nonlinearity of the logistic regression model. The MLE procedure yields unbiased, asymptotically efficient, and normally distributed regression coefficients (parameters).

CHAPTER THREE

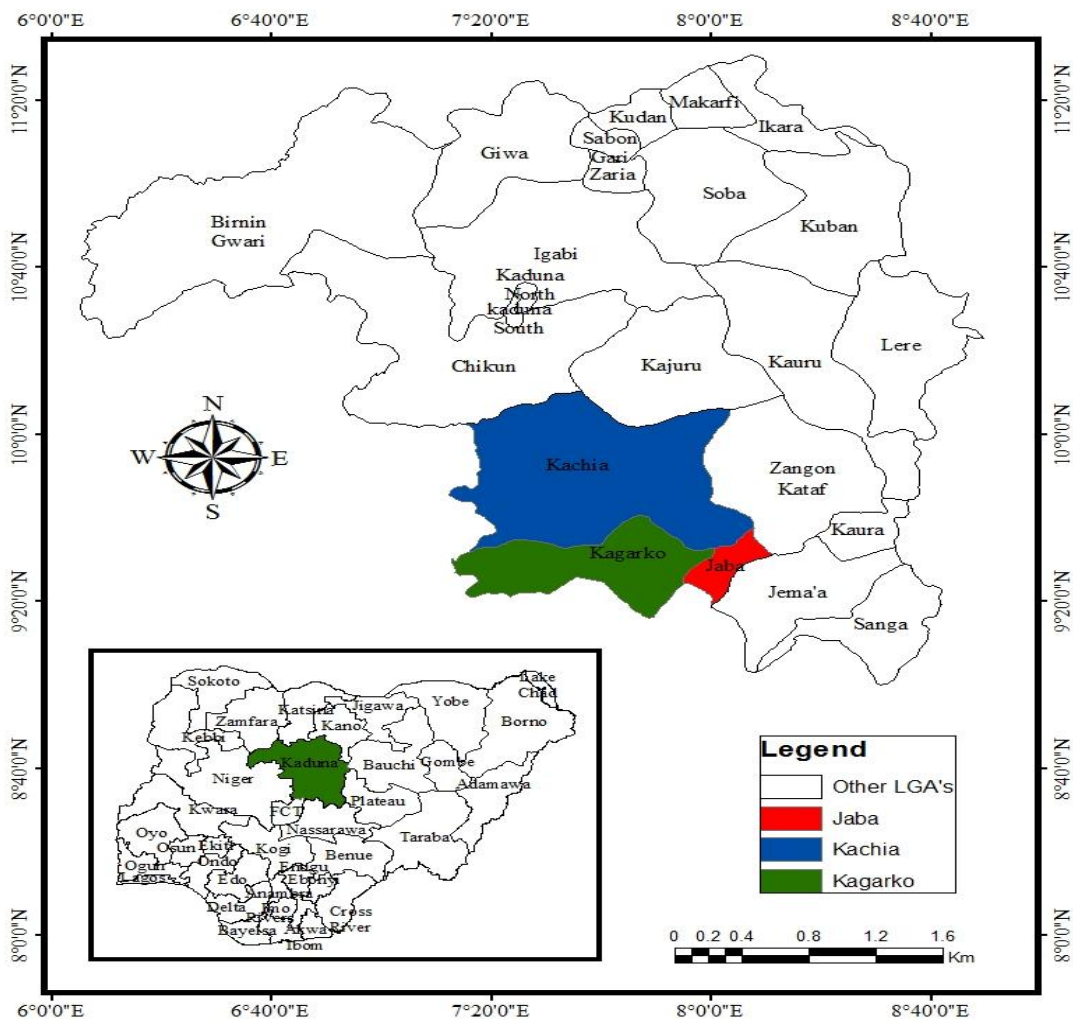
METHODOLOGY

3.1 The Study Area

Kaduna State lies in the north western part of country's agro-ecological zones, about 200km away from Abuja the federal capital. The state lies between latitudes 9°N and 12°N of the equator and between longitudes 6°E and 9°E of the prime meridian. Kaduna State shares boundaries with Katsina and Kano State to the north. Plateau to the north east, Nasarawa and Abuja to the south and Niger and Zamfara state to the west (Kaduna state government, 2012). The state occupies an area of approximately 68,000 square kilometers or 7% of Nigeria's land mass. The state has 23 Local Government Areas (NPC, 2006). The mean annual rainfall shows a marked decrease from South to North (1,524mm to 635mm). Two distinct seasons, rainy and dry witnessed in the state. The relative humidity is constantly below 40°C except in few wet months when it goes up to an average of 60 degrees. The duration of dry season is 5-7 months which normally starts from October; the state is agrarian and well suited for the production of arable crops such as maize, yam, millet, and sorghum because of favourable climatic conditions. Livestock production is also practiced in the state. Rearing of goats, sheep, cattle and different classes of poultry as well as marketing of their products is practiced in the state. The people of the state live mostly in organized towns and cities (Kaduna State Government, 2012). A large variety of non-agricultural occupations also exist.

The total population of the state is 6.11 million (NPC, 2006). Based on annual population growth rate of 3.2%, the projected population of the state is about 7474,369 million people in 2013. Within the state there are a number of establishments ranging from companies, research institutes, higher institutions and colleges.

Kaduna State is a multi-cultural and multi ethnic State and the main ethnic groups include: Fulani, Hausa, Bajju, Atyab, Jaba , Adara, Gwong, Gbagyi, Kurama, Ninzo, Ham, Koro, Kagoro, Kagoma, Kadara, etc. As culturally diverse people, Kaduna State has rich cultural heritage evidence in her diverse religious practices-i.e. Islam, Christianity, Traditional, cultural festivals –i.e. Durbar, music and dances, cuisines and culinary among others. Hausa is a major language spoken by a majority of the people due to the influence of Hausa people. Kaduna State provides the meeting point of the earliest histories of Northern Nigeria. It is the home of Nok which gave its name to the oldest culture of Nigeria-the Nok culture (Kaduna State Government, 2012).



Map of Kaduna State Showing the Study Areas
Source: BBGIS Consult, 2015

Figure 1: Map of Kaduna State showing the study area

3.2 Sampling Procedure and Sample Size

A multistage sampling technique was used in this study. The first stage was random selection of the three Local Government Areas (Kachia, Kagarko and Jaba). Secondly, six villages (Kachia, Kurmin Musa, Kagarko, Jere, Kwoi and Bitaro) was randomly selected. Finally, a simple random sampling was also employed in selecting household that are involved in livelihood diversification from each of the villages through balloting method from the list of sample frame. Sixteen percent (16%) of the sample frame (1383) was used as the sample size. A purposive selection of equal number of households that are not involved in livelihood diversification were also selected.

Table 3.1: Distribution of farmers in the study area

LGA	Villages	*Sample frame	Sample size (16%)
Kachia	Kachia	320	51
	Kurmin Musa	290	46
Kagarko	Kagarko	213	34
	Jere	163	26
Jaba	Kwoi	170	27
	Bitaro	227	36
Total		1383	220

3.3 Data Collection

Primary data was used for this study. This was collected with the aid of structured questionnaire. The information was collected on farmer's socio-economic characteristics such as age, household size, educational status, amount of credit received, numbers of extension contact, years spent on the cooperative, income. Information was collected on production about the level of inputs used and output in

crop, fishery, livestock and asset possess. As well as constraints faced by the farmers in farming household.

3.3 Analytical Techniques

The analytical tools used include: Descriptive statistics, logit regression and z-test statistics.

Descriptive statistics.

Descriptive statistics was used to achieve objective (i), (ii) and (v) of the study. It involves the use of measures of central tendency such as mean, frequency distribution, coefficient of variation and percentages to describe the socio-economic and institutional characteristics of farming household in the study area, i.e. objective (i), describe the livelihoods activities (farm and non-farm activities), i.e. objective (ii), engaged in by the farmers and the describe the constraints mitigating the farming household in the study area, objective (v).

Logistic Regression Analysis

Logit regression was used to achieve objective (iii) which is the factors influencing diversification of farming household in the study area. The general logit regression model is mathematically expressed as:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots \beta_9 X_9 + U$$

Where;

Y = Diversification(1=diversify, 0= not diversify)

X₁ = Age in years

X₂ = Labour usage in man days

X_3 = Farmers experience in years of farming

X_4 = House-hold size in numbers

X_5 = Farm size in hectares

X_6 = Access to credit in Naira

X_7 = Co-operative membership in years

X_8 = Extension contact in number of visit

X_9 = Income in naira

α = Constant

$\beta_1 - \beta_{14}$ = regression coefficients

e = error term

Z- test Statistic

The z-statistic was used to achieve objective iv of the study

The specific expression used to determine the t-statistic is as follows:

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1}{n_1} + \frac{S_2}{n_2}}}$$

Where:

z= calculated z value

\bar{X}_1 = mean value of household that are engage in livelihood diversification

\bar{X}_2 = mean value of household that are not involved in livelihood diversification

S_1 = standard deviation of household that are engage in livelihood diversification

S_2 = standard deviation of household that are not involved in livelihood diversification

n_1 = sample size of household that are engage in livelihood diversification

n_2 = sample size of household that are not involved in livelihood diversification

Chow-test statistics

The chow test was used to test hypothesis i, ii and iii which stated, there is no significant difference between the output, income and level of living of diversified household and non-diversified household. This was expressed mathematically as:

$$F = \frac{(RSSR - SSR1 - SSR2) / k}{(SSR1 + SSR2) / n - 2k}$$

Where;

RSSR = the sum of squared residuals from a linear regression in which b_1 and b_2 are assumed to be the same, b has dimension k , and there are n observations in total.

SSR_1 = the sum of squared residuals from a linear regression of sample 1.

SSR_2 = the sum of squared residuals from a linear regression of sample 2.

The total number of observation is $n = n_1 + n_2$ and the number of parameters is k .

3.5 Measurement of Dependent and Independent Variables

Nine explanatory variables measured as continuous and discrete variables were hypothesized for determinants of livelihood diversification.

(i) Age: This refers to the number of years of an individual attained from birth. It is a continuous variable and it was measured in years. Hofferth (2003) argues that the higher the age of the household head, the more stable the economy of the farm household, because older people have also relatively richer experiences of the social and physical environments as well as greater experience of farming activities. More also, older household heads are expected to have better access to land than younger heads, because

younger men either wait for a land distribution, or have to share land with their families. The estimated coefficient of age was expected to have positive sign on the diversification because have better access to land.

(ii) Education level: Education is generally considered an important variable that could enhance farmer's acceptance of new technologies. Ogunbameru (2001) posited that education was likely enhance the adoption of modern farm technologies by youth and thereby sustaining a virile farming population. The more educated farmers are, the more likely they adopt technology and also translate into production experience. Level of education is measured by number of years spent in formal schooling. The estimated coefficient of education was expected to have negative sign on the technical inefficiency model; this implies that the educational level of the farmer is reducing technical inefficiency thereby increasing technical efficiency.

(iii) Household size: This means the total number of people in the house which includes the wives, children and dependents that reside within the same house. Since food requirements increases with the number of person in the household and also because land and finance to purchase agricultural inputs are limited. Increasing family size, according to Brown (2004), tends to exert more pressure on consumption than the labour it contributes to production. The larger the family size the more favorably disposed will be the members to diversify farming productionoperation. The estimated coefficient of household size was expected to have positive sign on diversifying on off-farm or on-farm activities.

(iv) Amount of money received: This refers to amount of money received from both formal and informal sources. It will be measured as the actual money/credit borrowed.

Credit is a very strong important factor that is needed to acquire or develop farm enterprise (Ekong, 2003). Its availability could determine the extent of production capacity. This was measure as amount received in naira. The estimated coefficient of credit obtained is expected to have positive sign on the household livelihood diversification. The a priori expectation for amount of money received is expected to be positive; this implies that the amount of money received by the farmer is increasing on household livelihood diversification.

(v)Extension contact: Agricultural extension service constitutes a driving force for any agricultural development. The relationship between agricultural extension agent and the farmer is an important determinant in improving yield, income of the farmers as well as in ensuring food security (Chikezie *et al.*, 2012). The more number of visits of an extension agent to the farmers, the greater the chance for them to adopt innovation. It was measured in terms of number of visits made by an extension agent. The estimated coefficient of extension contact was expected to have positive sign on the household livelihood diversification. This implies that the extension contact of the farmer will increase on the household livelihood diversification.

(vi)Co-operative membership: Co-operative groups are organized for the promotion of special interest or meet certain needs that cannot be achieved by the individual efforts. They contribute to the dissemination of new ideas, practices and products as well as in sourcing for loan and farm input (Chikezie *et al.*, 2012). Farmers that belong to a co-operative society are likely to adopt new technology easily than those not in any co-operative. Thus it influences the attitude of members towards livelihood diversification. This variable was used to characterize farmers based on particular involvement in

farming operation. The estimated coefficient of cooperative membership is expected to have positive sign on the on the household livelihood diversification.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1.1 Age distribution of the respondents

The result in Table 4.1 shows that about 56% of respondents involved in livelihood diversification were within the age range of 41-50 years. The average age of household was found to be approximately 44 years with minimum of 33 years and maximum of 70 years. This result imply that the farming household in the study area were young farmers still in their active productive age group. Age is very important in agricultural production activities because age has a significant influence on the decision making process of farmers with respect to adoption of improved farming technologies and other production-related decisions. Asongwa, Ihemeje and Ezihe (2011) argued that age of farmers have a positive effect on technical inefficiency effects. This is because old people are considered to be less energetic and less receptive to agricultural innovations and hence develop inefficient production routines and practices (Asongwa *et al.*, 2011).

Table 4.1: Age distribution of the respondents

Age (years)	Frequency	Percentage
31-40	54	24.5
41-50	122	55.5
51-60	31	14.1
61-70	13	5.9
Total	220	100
Min	31	
Max	70	
Mean	44	
Std Dev.	7.63	
S.E	0.92	

4.1.2 Household size of the respondents

The result presented in Table 4.2 shows the distribution of household who are involved in livelihood diversification. About 55% of the respondents who involved in livelihood diversification had household size that ranged from 1-5 persons in their family with an average family size of 7 persons. The maximum family size observed was 30 persons with a minimum of 1 person. Size of the household may enhance labour availability that can be used for different agricultural activities (Oyewole, 2012). The significance of household size in agriculture hinges on the fact that the availability of labour for farm production, the total area cultivated to different crop enterprises, the amount of farm produce retained for domestic consumption, and the marketable surplus are all determined by the size of the farm household (Amaza, Tahirou, Patrick, and Amare 2009). However, Ahmed (2011) argued that large household size is associated with

increased household consumption expenditure which reduces the money that could be used for production purposes.

Table 4.2: household size of farming households

Family size (number)	Frequency	Percentage
1-5	121	55.1
6-10	52	23.6
11-15	32	14.5
16-20	15	6.8
Total	220	100
Min	1	
Max	20	
Mean	7	
Std Dev.	3.37	
S.E	0.81	

4.1.3 Educational level of the respondents

The result in Table 4.3 revealed that about 64% of the respondents had no formal education while about 36% had one form of education or the other. Over 90% of the respondents had a low educational experience not exceeding primary education, which may impede on the acceptance of livelihood diversification. Literacy is believed to have a positive implication on efficient use of productive resources, adoption of farm innovation and income diversification. The level of education determines the level of opportunities available to improve livelihood strategies, enhance food security, and reduce the level of poverty. It affects the level of exposure to new ideas and managerial

capacity in production and the perception of the household members on how to adopt and integrate innovations into the household's survival strategies.

Table 4.3: level of education of farming households

Education (years)	Frequency	Percentage
No formal education	140	63.6
Primary education	59	26.8
Secondary education	14	6.4
Tertiary education	7	3.2
Total	220	100

4.1.4 Farming experience of the respondents

The result presented in Table 4.4 shows the distribution of farming experience of the household that are involved in livelihood diversification. Result revealed that 41.3% of the respondents had 11-20 years of experience. The maximum farming experience observed was 40years with a minimum of 3year and average of 18 years of experience in farming. The farmers are quite experienced in crop production and livelihood diversification.

This result implied that farmers in the study area have sufficient experience in production. Farming experience of a farmer determines his ability to make effective farm management decisions, not only adhering to agronomic practices but also with respect to input combination or resource allocation. Farming experience is expected to influence farm production efficiencies because of accumulation of skills. Adebayo

(2006) noted that the longer a person stays on a particular job, the better his job performance. The result suggests that job performance in crop production would be better under long years of experience.

Table 4.4: farming experience of farming households

Farming Experience	Frequency	Percentage
1-10	56	25.5
11-20	91	41.3
21-30	47	21.4
31-40	26	11.8
Total	220	100
Min	1	
Max	35	
Mean	18	
Std Dev.	5.17	
S.E	0.49	

4.1.5 Distribution of respondents according to farm size

The result presented in Table 4.5 shows that majority (96.8%) of the respondents had farm size of 0-2 hectares. The maximum farm size observed was 6 hectares with a minimum of 0.2 hectares and average of 1.4 hectares in crop productions. The implication of this finding is that the respondents are predominantly small-scale farmers. These results also agreed with Ojuekaiye's (2001) classification of farms between 0.1 hectares and 5.9 hectares as small-scale. Small farm size is an impediment

to agricultural mechanization because using farm machineries like tractors for farm operation will be underutilized.

Table 4.5: farm size of farming households

Farm size (hectares)	Frequency	Percentage
0-2.0	213	96.8
2.0-4.0	6	2.7
4.1-6.0	3	1.4
Total	220	100
Min	0.1	
Max	4.5	
Mean	1	
Std Dev.	2.69	
S.E	0.09	

4.1.6 Credit obtained by the respondent

Adequate funding is required by farmers to finance all crop production and diversified livelihood activities. The results presented in Table 4.6 indicate that the majority 92.3% of farmers had no access to credit to finance their production activities.

The study revealed that the majority (41.2%) of those who had access to credit ranges between ₦40,001 - ₦80,000 with an average of ₦45,000. The minimum and maximum amount of ₦10,000 and ₦120,000 respectively. However, a large number of farmers had no access to funds to finance their crop production activities, which in turn reduce

their involvement in livelihood diversification activities. The result reveals that commercial banks are less patronized for financial support for farming in the study area. This may be due to avoidance of high interest rate on collected loan. Ekong (2003) asserts that credit is a very strong factor that is needed to acquire or develop any enterprise; its availability could determine the extent of production capacity. According to Tijani *et al*(2006), access to credit provides the farmer with a means of expanding and improving his farm.

Table 4.6: Distribution of respondents according to credit obtained.

Access to credit (N=220)	Frequency	Percentage
No access to credit	203	92.3
Access to credit	17	7.7
Amount received (n=17)		
₦10,000- ₦40,000	6	35.3
₦40,001- ₦80,000	7	41.2
₦80,001- ₦120,000	4	23.5
Min	₦10,000	
Max	₦120,000	
Mean	₦45,000	
Std Dev.	1337.2	
S.E	1.99	

4.1.7 Distribution of respondent based on membership of cooperative society

The result presented in Table 4.7 revealed that about (85%) of respondents do not participate in any cooperative association while those who were members of cooperative society constituted 15%. This implies that farmers had no opportunity of interacting with other farmers to enhance diffusion of innovations among the farmers. This finding is at variance with Odebiyi (2010) that cooperative groups ensure that their members derive benefits from the groups such as they could not derive individually. According to Idiong *et al.* (2007), membership of cooperative affords the farmers opportunities of sharing information on modern crop practices.

Table 4.7: cooperative association of farming households

Cooperative association (N=220)	Frequency	Percentage
Non members	187	85.0
Members	33	15.0
Members of Cooperative (n=33)		
1-3 years	15	6.8
4-6 years	12	5.5
7-9 years	5	2.3
10-12 years	2	0.9
Min	1	
Max	12	
Mean	5	
Std Dev.	1.26	
S.E	0.65	

4.1.8 Distribution of respondent according to their income

The result presented in Table 4.8 Shows that majority (63.2%) of the respondents had income ranging between ₦1 – ₦20,000 with minimum and maximum amount of ₦1,000 and ₦80,000, respectively. This means that farmers in these communities relied absolutely on farm business and must have acquired a lot of farming experience over time. According to FAO (1999), employment in non-farm activities is essential for diversification of the sources of farm household's livelihood. It enables households to modernize their production by giving them an opportunity to apply the necessary inputs.

Table 4.8: income of farming households

Income (₦)	Frequency	Percentage
1-20,000	139	63.2
20,001-40,000	51	23.2
40,001-60,000	18	8.2
60,001-80,000	12	5.5
Min	₦5,000	
Max	₦80,000	
Mean	₦22,000	
Std Dev.	121.2	
S.E	0.91	

4.2 Livelihood Activities Engage in by Farmers

The result presented in Table 4.9 shows that all households derived income from farming with an average of 60.6% of the total household income. Crop production, which is mainly subsistent in nature is by far the most single source of income, providing about 51.3% of total income. More than half of the household derived their income from livestock enterprises which however account for 9.3% of total income. Most of the livestock activities found in Kaduna State were small scale in nature, predominantly extensive free range backyard types.

About 39% of the household receive income from off-farm sources, these off-farm activities mainly include handicrafts, food processing, shop keeping and other local services as well as trade in agricultural and non-agricultural goods. About 39% received income from supplying agricultural wage/labour, which account for 21% of the total income. Forty percent participated in non-agricultural wage activities, but this source only contributes 6% to total income. Non-agricultural wages, employment includes formal and informal jobs in construction, manufacturing, education, health, commerce, administration and other services.

Table 4.9: livelihoods activities engaged in by the farmers

Diversification	Household income	Percentage contribution
Crop income	729, 919.99	51.3
Livestock income	132, 324.67	9.3
Total on-farm income	862, 244.67	60.6
Agricultural wage income	298, 797.66	21.0
Non-agricultural wage income	261, 803.66	18.4
Total off-farm income	560, 601.34	39.4
Total income	1, 422, 846	100

4.3 Socioeconomic factors influencing farming household livelihood diversification

The Logit model was estimated using Shazam software in estimating factors that influenced diversification by farmers in Kaduna state. The estimated coefficients of the Logit model, along with the standard error, t-values and marginal effect are presented in Table 4.9. The likelihood ratio test was 63.259 with 6 degree of freedom significant at ($p \leq 0.01$). This implies that all the variables included in the Logit model are jointly significant in influencing farmers' decision to diversify to other income generating activities. Therefore, the socioeconomic characteristics of farmers have a significant effect on their decision to diversify. Table 4.9 shows that education, market, credit, farming experience, extension and male-headed household, are statistically significant determinants of diversification. However, the parameter estimates of the Logit model provide only the direction of effect of the independent variables on

the dependent (response) variable: estimates do not represent actual magnitude of change or probabilities. Thus, the marginal effects from the model, which measure the expected change in probability of a particular choice being made with respect to a unit change in an independent variable, are also reported in Table 4.9.

Education is expected to have a positive effect on off-farm work decisions if the effects of human capital on off-farm wages outweigh the increase in the shadow value of labour on the farm (Lass *et al.* 1991). Education is positive and significant at 1% indicating a rather strong relationship with non-farm income generating activities. This suggests that households with higher education are more likely to seek non-farm employment in rural areas. The marginal effect of 0.066 shows that one extra year of education increases the probability of non-farm employment by 6.6%. This is similar to the findings of Ibekwe (2001) and Parasada (2002). It is understandable that where the education of household workers is higher, they are reluctant to work in the farm sector as they have better prospects elsewhere.

If members of farm households have access to credit, then the probability of working off-farm is expected to increase. As expected, credit is positive and significant at 10%, implying that farmers who have access to credit are more likely to diversify than those with no access to credit. The marginal effect of 0.701 shows that one extra credit increases the probability of non-farm employment by 70.1%.

The result presented in Table 4.10 shows that distance to the market is significant at the 1% level and negatively related to diversification, indicating that farmers who lived further away from the market are less likely to be involved in off-farm activities. The

participation of farm family members in off-farm markets is affected not only by their willingness and ability to supply labour but also by the demand for their labour. Therefore, a long distance to the nearest market reduces the probability of working off the farm. Increase in distance to nearest market decreases probability to seek for off-farm employment.

Farming experience increases the value of the marginal value of farm work relative to the marginal value of off-farm work. So the probability of participation of farm households are expected to diminish (Beyene 2008). In this study, farming experience is negatively related to diversification and is significant at 1%.

Extension contact is expected to have a positive effect on off-farm work decisions. Extension is positive and significant at 5% indicating a direct relationship with non-farm income generating activities. This suggests that households with extension contact are more likely to seek non-farm employment in rural areas. This may not be unconnected with the fact that farming is still done through the use of traditional method. The farmers are still using traditional farming implements such as hoes and cutlasses for farming at subsistence level and these make farming difficult, small scale and unrewarding. Thus, making the farming household to lose/decline interest in farming and seeking off-farm employment. The marginal effect of 0.299 shows that one extra extension contact increases the probability of non-farm employment by 29.9%.

If male-headed households have more access to opportunities than female-headed households, the probability of working off-farm is expected to be positive for the former (Beyene 2008). Moreover, women are usually more time constrained given their greater involvement in home chores. This may likely reduce their probability of engagement in non-farm income generating activities compared to their male

counterparts. The male-headed households are positively related to diversification and significant at the 10% level. Male-headed households are 6.3% more likely to diversify into non-farm activities than female headed households.

Table 4.10: Socio-economic factors influencing farming household livelihood diversification

Variable	Coefficient	Standard error	T-value	Marginal effect
Constant	-17.625	13.376	-1.317	
Age	0.965	0.884	1.092	0.083
Education	0.151	0.059	2.559***	0.066
Credit	0.919	0.538	1.708*	0.705
Cooperative membership	-0.644	0.6531	-0.819	0.413
Market	-0.301	0.101	-2.980***	0.795
Farming experience	-0.549	0.224	-3.851***	0.031
Extension contact	0.535	0.256	2.089**	0.299
Household head	0.0045	0.0024	1.875*	0.063
Numbers of observation 220				
Log likelihood ratio test 63.259				
F-distribution 0.224				
McFadden R-square 0.58				

***p < 0.001

**p < 0.05

*p < 0.10

4.4 Impact of diversification on household output, income and level of living

4.4.1 Impact of diversification on household output

An independent samples t-test was conducted to analyse impact of diversification on household output. The t-test indicated that there was significant difference between output of household that are involved in livelihood diversification and the output of household that are not involved in livelihood diversification. The result shows that the output of household that are involved in livelihood diversification is positively related with the output of household that are not involved in livelihood diversification at $p < 0.05$. The calculated t-value was 4.82 and exceeds the critical value (t-critical two tail)

of 1.91, therefore these relationships suggest direct relationship between the output of household that are involved in livelihood diversification and the output of household that are not involved in livelihood diversification. This result also implies that livelihood diversification has a significant impact on the output of the farmer in the study area.

Table 4.11: Impact of diversification on household output

	<i>Output of diversify household</i>	<i>Output of non-diversify household</i>
Mean	152113.9241	65249.30556
Standard deviation	141648.1	71461.71
Observations	220	220
Hypothesized Mean Difference	0	
Df	218	
t Stat	4.819090972	
P(T<=t) one-tail	2.16649E-06	
t Critical one-tail	1.657869522	
P(T<=t) two-tail	4.33298E-06	
t Critical two-tail	1.91**	

**p < 0.05

4.4.2 Impact of diversification on household income

An independent samples t-test was conducted to analyse impact of diversification on household income. The t-test indicated that there was significant difference between income of household that are involved in livelihood diversification and the income of household that are not involved in livelihood diversification. The result shows that the income of household that are involved in livelihood diversification is negatively related with the income of household that are not involved in livelihood diversification at $p < 0.05$. The calculated t-value was 13.71 and exceeds the critical value (t-critical two tail) of 1.91, therefore these relationships suggest inverse relationship between the income of household that are involved livelihood diversification and the income of non-

diversifying household. This result also implies that livelihood diversification has a significant impact on the income of the farmer in the study area.

Table 4.12: Impact of diversification on household income

	<i>income of non-diversify household</i>	<i>income of diversify household</i>
Mean	416.901	1350.633
Standard deviation	116.785	591.797
Observations	220	220
Hypothesized Mean Difference	0	
Df	218	
t Stat	-13.72939973	
P(T<=t) one-tail	1.39118E-23	
t Critical one-tail	1.6629785	
P(T<=t) two-tail	2.78236E-23	
t Critical two-tail	1.91**	

**p < 0.05

4.4.3 Impact of diversification on household level of living

An independent samples t-test was conducted to analyse impact of diversification on household level of living. The t-test indicated that there was significant difference in level of living of household that are involved in livelihood diversification and the level of living of household that are not involved in livelihood diversification. The result shows that the level of living of household that are involved in livelihood diversification is negatively related with the level of living of household that are not involved in livelihood diversification at $p < 0.05$. The calculated t-value was 13.73 and exceeds the critical value (t-critical two tail) of 1.91, therefore these relationships suggest inverse relationship between the level of living of household that are involved livelihood diversification and the level of living of non-diversifying household. This result also implies that livelihood diversification has a significant impact on the level of living of the farmer in the study area.

Table 4.13: Impact of diversification on household level of living

	<i>Level of living of non-diversify household</i>	<i>Level of living of diversify household</i>
Mean	48375	289512.8205
Standard deviation	16087.29	510215.4
Observations	220	220
Hypothesized Mean Difference	0	
Df	218	
t Stat	-4.171817685	
P(T<=t) one-tail	3.93112E-05	
t Critical one-tail	1.664884537	
P(T<=t) two-tail	7.86225E-05	
t Critical two-tail	1.91**	

**p < 0.05

4.4.3.1 Hypothesis of the Study

Hypothesis I

The null hypothesis (H_0) which stated that there is no significant difference between the output of diversified household and non-diversified household was tested using the result of a chow-test presented in Table 4.14. The result revealed that the Chow F calculated was 4.82, while F table value at 6 degree of freedom with sample size of 220 was 1.91 at 5% level of probability implying a significant impact of diversification on the output of diversified farmers in the study area since the F calculated was greater than the F table. Hence, we reject the null hypothesis that there is no significant impact of diversification of output on diversified household in the study area and accept the alternative hypothesis.

Hypothesis II

The null hypothesis (H_0) which stated that there is no significant difference between the income of diversified household and non-diversified household was tested using the result of a chow-test presented in Table 4.14. The result revealed that the Chow F calculated was 13.73, while F table value at 6 degree of freedom with sample size of

220 was 1.91 at 5% level of probability implying a significant impact of diversification on the income of diversified farmers in the study area since the F calculated was greater than the F table. Hence, we reject the null hypothesis that there is no significant impact of diversification of income on diversified household in the study area and accept the alternative hypothesis.

Hypothesis III

The null hypothesis (H_0) which stated that there is no significant difference between the level of living of diversified household and non-diversified household was tested using the result of a chow-test presented in Table 4.14. The result revealed that the Chow F calculated was 4.17, while F table value at 6 degree of freedom with sample size of 220 was 1.91 at 5% level of probability implying a significant impact of diversification on the level of living of diversified farmers in the study area since the F calculated was greater than the F table. Hence, we reject the null hypothesis that there is no significant impact of diversification on level of living of diversified household in the study area and accept the alternative hypothesis.

Table 4.14: The result of chow-test showing significant impact on output, income and level of living of diversified and non-diversified farmers

Output	R²	RSS	N	K	F-cal	F-tab
Pooled samples	0.57	3248109E+07	220	7	4.83	1.91
Diversified household	0.51	2426267 E+07				
Non-diversified household	0.34	7294023 E+06				
Income						
Pooled Samples	0.49	4856141E+06	220	7	13.72	1.91
Diversified household	0.36	2050848 E+06				
Non-diversified household	0.34	1247981 E+06				
Level of Living						
Pooled Samples	0.59	101042.3	220	7	4.17	1.91
Diversified household	0.41	80959.42				
Non-diversified household	0.24	10824.25				

R² = regression coefficient, RSS = residual sum of square, N = numbers of observation and K = numbers of parameters

4.5 Constraints Mitigating the Farming Household to Diversify

The major constraints to livelihood diversification in the study were: lack of credit facilities, poor asset base, lack of awareness and training facilities, fear of taking risk and lack of opportunities in non-farm sector (Table 4.15).

The result presented in Table 4.15 revealed that about 86% of the respondents reported that lack of credit facilities was the major constraint mitigating farming household diversification. Lack of access to institutional credit is a deterrent factor in livelihood diversification in the study area. In the absence of credit support from the institutional agencies, the resource-poor households are not able to start their own non-farm business or enterprises. Katona-Apte (1988) had reported the vital role played by the Bangladesh Grameen Bank in providing credit to women which enabled them to carry out diversification activities. Many households in the study area reported that after completion of training, provided by the private or government agencies on some

self-employment activities, they could not start their own business due to lack of finance/credit.

About 79% of the respondents reported poor asset base it is one of the most important constraint to livelihood diversification in the study. Possession of even a small asset enables the households to take opportunities in the non-farm sector, particularly in the self-employment sector. Ownership of a sewing machine may induce a person to start his own tailoring business. Similarly, possession of a bicycle may help the worker in going to the nearby town for non-agricultural employment. Most of the landless and small farmers in this area do not have any asset which acts as a big barrier to livelihood diversification.

Lack of awareness and training constitute about 69% constraint mitigating livelihood diversification in the study. According to rural households in the study area, they are unaware about any schemes provided by the government for the development of rural sector. There is no government mechanism, nor any non-governmental organization to inform the rural households regarding livelihood diversification.

About 50% of the respondents indicates fear of taking risk. Because, small farmers in the study area do not have any asset and also lack of institutional support which acts as a big barrier to livelihood diversification, the risk-bearing ability of the rural households is very low.

The result also revealed that about 34% of the respondents indicates lack of opportunities in non-farm sector were constraint mitigating livelihood diversification in the study area. Opportunities for non-farm jobs, within or around the sample villages, are very low. Therefore, the households do not have much scope to diversify their livelihood.

Table 4.15: Constraints mitigating the farming household livelihood diversification

Constraints	Frequency	Percentage
Lack of credit facilities	189	85.9
Poor asset based	174	79.0
Lack of awareness & training facilities	152	69.1
Fear of taking risk	101	45.9
Lack of opportunity in non-farm sector	74	33.6

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The focus of this study was to analyse the livelihood diversification pursued by farming households in Kachia, Kagarko and Jaba Local Government areas of Kaduna State, Nigeria. The primary data were collected from 220 respondents using structured questionnaire. The statistical tools used to analyse the data were descriptive statistics, logit regression and t-statistics. The result of the analysis shows that 56% of the respondents fell within the age range of 41-50 years with an average age of 44 years, 55% of the respondents had household size of 1-5 people. Majority (64%) of the respondents are not literate. About 41% of the respondent had farming experience of 11-20 years. About 90% of the respondents do not have access to credit; majority (90%) of the farmers had farm size ranging from 0-2.0 hectares. However, 85% of the farmers do not belong to any cooperative association while about half 50% of the respondents had no other source of income.

The result of this study also shows that all the households derived income from farming which in average account for 60.6% of the total household income. Crop production, provides about 51.3% of total income. More than half of the household derived income livestock enterprises which however account for less than 9.3% of total income. About 39% of the household receive income from off-farm sources, and 44% received income from supplying agricultural wage/labour, which account for 13% of the total income.

The Logit model is used in estimating factors that influenced diversification by farmers in Kaduna state. The estimated coefficients of the Logit model, along with the standard error, t-values and marginal effect are presented. The likelihood ratio test was 63.259 with 6 degree of freedom is significant at ($p \leq 0.01$). This implies that all the variables

included in the Logit model are jointly significant in influencing farmers' decision to diversify to other income generating activities. Therefore, the socioeconomic characteristics of farmers have a significant effect on their decision to diversify. The result shows that education, market, credit, farming experience, extension and male-headed household, are statistically significant determinants of diversification.

An independent samples t-test was conducted to analyse impact of diversification on household output, income and level of living. The t-test indicated that there was significant difference between output, income and level of living of household that are involved in livelihood diversification and non-diversifying household. The result shows that the output, income and level of living had a significant effect on the household that are involved in livelihood diversification at $p < 0.05$ level of probability.

Finally, the major constraints to livelihood diversification in the study were: lack of credit facilities, poor asset base, lack of awareness and training facilities, fear of taking risk and lack of opportunities in non-farm sector.

5.2 Conclusion

Based on the findings of this study, it could be concluded that engagement in off-farm income generation activities decreases with farming experience while it increases with male-headed household, education, credit and market. Showing that farmers who have alternative sources of income are more able to cater to the food and non-food requirements of their households. The finding further suggest that education, credit and markets are crucial for household livelihood diversification in the study area.

5.3 Contribution of the study to knowledge

- i. The study showed crop production contribute 51.3% of total income. Livestock enterprises 9.3% of total income while 39% of the household derived their income from off-farm sources.
- ii. The study revealed that livelihood diversification has a significant impact at 5% level on output, income and level of living of the farmers in the study area.

5.4 Recommendations:

- i. Since lack of credit facilities and poor access to institutional credit are overwhelmingly acknowledged as the important constraints inhibiting livelihood diversification, the rural financial systems need to be revamped. Non-governmental organization and other donor agency in collaboration with the government can link farmers to access credit through reduced interest rates and possibly a waiver of collateral requirement for a small amount of loans.
- ii. Education is an effective means of increasing the livelihood diversification strategies as it is highly significant. There is little doubt that rural education in the study area is under stress and facing a tough challenge from the urban education system. Targeting of education and skill development trainings towards poor households in the rural areas is likely to have a relatively large impact on their ability to diversify livelihood options.
- iii. Efforts should be made to make remunerative non-farm opportunities accessible to the rural households. This includes the development of rural infrastructure in terms of road, market, electrification, telecommunication, storage facilities, etc. and also institutional innovations to reduce entry costs and barriers to poor

livelihood groups. Because provision of good roads could enhance farmers' access to market and hence promote diversification into non-farm activities.

- iv. Extension service should be strengthened so as to expose farmers to modern farming techniques and improved technologies. In this case, both access to extension service and the frequency of contact between extension staff and farmers should be strengthened. One way of ensuring livelihood diversification is through the participatory extension approach.

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**DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL
SOCIOLOGY, AHMADU BELLO UNIVERSITY, ZARIA.**

Dear Sir/Madam,

I am a post graduate student (M.sc) of the aforementioned department carrying out a research on the topic:**ANALYSIS OF LIVELIHOOD DIVERSIFICATION**

PURSUED BY FARMING HOUSEHOLDS IN SOME SELECTED LOCAL GOVERNMENT AREAS KADUNA STATE, NIGERIA. Please kindly answer the following questions to the best of your knowledge. Information provided will be treated confidentially.

Best of regards,

Instruction: Kindly tick (✓) or fill in the blank spaces as appropriate

SECTION A

- 1 Name of farming household
- 2 Sex: Male () Female ()
- 3 Age (years)
- 4 Highest level of Education:
 - (a) No Formal Education () (b) Primary Education () (c) Secondary Education ()
 - (d) Tertiary Education ()
6. Family size (All the number of the people depending on you for Living).....
 - (a) No. of Adult Male () (b) No. of Adult female () (c) Children >15yrs ()
 - (d) Children <15yrs ()
7. If you have diversified into non-farm activities, do you have access to market? a) Yes b) No
8. Access to credit facilities. Please specify by ticking as appropriate whether you have access to the following type of credit

	Types of credit	Yes	No
1	Credit for Agricultural production		
2	Credit for Off-farm business		
3	Credit for household consumption		

9. If ‘Yes’ from which sources do you get credit and the amount in the last one year (please fill appropriate)

Source of Credit		Agricultural Credit		Off-farm business		Household	
		Amount Taken	Interest Paid	Credit		Consumption	
				Amount taken	Interest paid	Amount taken	Interest Paid
1	Bank						
2	Money Lender						
3	Cooperatives						
4	Government loan						
5	Friends & relatives						
	Others specify						
6							

SECTION B

1. Have you diversify into non-farm income enterprise Yes () No ()
2. If you have diversified into any of the income activities listed below, please tick (✓) all that apply to you.

S/no	Income source	Amount in ₦ per week or per month or per quarter or

		per year
1	Self employed (farming, trading, blacksmith, carpentry, crafts , barbing, etc)	
2	Private employed (salaried)	
3	Government employed (salaried)	
4	Remittance from children and relatives	
5	Gifts	
6	Pension/government bonus	
7	Revenue from leasing out land and other resources/rent	
8	Wage from agricultural labour supply on other people's farm	
9	Other sources specify	

3. Why did you diversify your operations? Please tick (✓) one main reason from the list below.

s/no	Reason for diversification	✓
1	To generate sufficient income	
2	To diversify away from agriculture	
3	Availability of government grant	
4	Conservation & environmental reasons	
5	to employ family members	
6	identification of market opportunity	
	Other specify	

4. If you are engage in livestock farming; how many livestock animals do you currently have? Number of livestock owned.....

SECTION C

Household Expenditure:

In the last one week, month or one year (whichever is easier), indicate the amount spent on following items by your household.

Food expenditure	Last one week (₦)	Last one month (₦)	Last one year(2014) (₦)
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Staple foods (Garri, yam tuber, cocoyam, maize flour, sorghum, grain flour, groundnut, beans, rice, millet)			
Vegetables (okra, tomato, pepper, onion, spinach, carrot, bitter leaf)			
Fruits (orange, mango, pawpaw, guava, coconut)			
Meat & animal product (beef, chicken,fish, crayfish, egg)			
Dairy products and Beverages (Milk, Cheese, Yoghurt, ice cream)			
Drinks			
Others food expenses specify			

Non-food Expenditure

Non-food Expenditure	In the last month Amount spent in naira	In the last one year (2014) Amount spent in naira
Clothing(fabric, clothes, beddings, foot		

wares)		
Purchase of vehicles/motor cycles/bicycles		
Repairs Of Vehicles/motor cycles/Bicycles		
Home Repairs(Painting, Roofs, Plastering)		
House rent, water bill, electricity, GSM bills		
Kerosene, charcoal, firewood, gas cost		
Alms, offering, tithe, charity		
Radio/Television/Fan		
Ceremony- wedding, naming, funerals, graduation		
Extra Land		
Other non-food expenses specify		

OTHER WELFARE MEASURES:

- (a) Do you pay any levies to LGA or State or any other stakeholders in your area?
- (b) How much do you pay (₦).....? Per weekly/monthly/yearly.
- (c) What benefits do you receive from paying the levies above.....?
- (d) Has diversifying into non/off-farm activities helped in alleviating your poverty
a) Yes () b) No ()
- (e). If yes, on a scale of 0 – 5, what level can you select for the contribution livelihood diversification to your household poverty alleviation with zero (0) implying zero (0) or no contribution and 5 implying the highest contribution
- (f). In what way can you say diversification into farm/non-farm has helped in alleviating your poverty?

SECTION D:

1. What is/was your level of income before diversification? (a) Very high (b) high (c) average (d) low (e) very low
- 2.What is your level of income after diversification? (a) Very high (b) high (c) average (d) low (e) very low

3. How much do you earn in Naira from your primary occupation (monthly or yearly)? (₦).....
4. How much do you earn in Naira from your secondary occupation (monthly or yearly)? (₦).....
5. What is the effect of the above income(s) on your household (a) Positive () (b) Fairly positive () (c) Strongly positive () (d) Negative ()
6. Are there other working members in your household? (i) Yes () (ii) No ().
7. If yes, how much did your household members earned? (₦).....
8. In terms of your family's (living standard) do you think things have change for the better or for the worse through diversification?
9. What was/is the level of your income from farm/ non-farm activities?

S/NO.	Farm Activities	Amount (N) (2014)	Non-Farm Activities	Amount (N) (2014)
1)				
2)				
3)				
4)				
5)				
Total				

SECTION E

Please indicate by ticking (√) in order of importance

S/n	Constraints affecting livelihood diversification	Most Important Constraint	2 nd most important constraint	Coping Strategy
1	Lack of access to formal loan			

2	Poor access to market			
3	Unavailable skilled labor supply			
4	High cost of business premises			
5	Low market			
6	Gender issues			
7	High tax rate			
8	Unstable electricity			
	Others factors specify			
9				
10				

Thank you for your attention.