

**ASSESSMENT OF AGRICULTURAL PRODUCTIVITY IN GURARA LOCAL
GOVERNMENT AREA OF NIGER STATE, NIGERIA**

BY

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DECLARATION

I hereby declare that the work in this dissertation titled “**Assessment of Agricultural Productivity in Gurara Local Government Area of Niger State, Nigeria**” was carried out by the researcher Abubakar ADAMU under the supervision of Dr. J.O. Adefila and Dr. R.O. Yusuf. All information obtained from literature has been acknowledged in the text as well as the list of all references.

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CERTIFICATION

This dissertation titled “**Assessment of Agricultural Productivity in Gurara Local Government Area of Niger State, Nigeria**” by Abubakar ADAMU meets the Regulations Governing Award of Degree for Masters in Science, in Ahmadu Bello University, Zaria. It is also approved for its input to knowledge and literary presentation.

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DEDICATION

This dissertation is dedicated to my late father Mallam Nyizhe Santali Bonu and my mother Jumai (Nma) Nyizhe.

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ABSTRACT

Agricultural production remains the main source of most rural communities in developing countries like Nigeria. Unfortunately, this sector is highly vulnerable to changes, which affect the rural people. This study assessed the changes in agricultural production in Gurara Local Government Area of Niger state. The objectives were to characterize the changes in agricultural productivity; factors inducing the changes, compare changes in crop production and animal production as well examine farmer's perception to these changes. Multi stage sampling technique was used to administer questionnaire to 382 respondents. Data were analyzed using frequency distribution tables, graphs as well as inferential statistics in SPSS version 20 and Microsoft Excel 2010. The result reveals that majority (81%) of the respondents observed the significant changes in agricultural productivity. Yam was the most (32.9%) cultivated crop, followed by maize, then sorghum with 20.3%. Regarding animal production, 29.2% of the respondents were into poultry production, 25% were into catfish production, while only 6.9% and 9.7% were into sheep and pig rearing respectively. It shows that majority of respondents in Gurara west raised 51-100 chickens (local breeds) as against 5-20 chickens in Gurara East. Over 60.6% respondents did not have access to farm inputs such as herbicides and pesticides, fertilizer and improved seeds. Also, over 80% lack access to extension services and micro finance credit. Weather variations in terms of temperature increase and rainfall decrease over the last 30 years has contributed to low crop yield. Empirical evidence revealed that there is a spatial variation between the divisions and over the years with regards to crop such as rice, sorghum, groundnut and yam and animal productions such as catfish, cattle, poultry, and sheep in the study area. The study recommended among others that government should increase access to farm inputs with ease and at affordable price; meteorological forecast should be

translated and interpreted into various local languages for effective utilization by farmers by NiMET.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Agriculture is an important channel for encouraging growth in developing countries. The World Bank (2007) observed that 9% growth increase in agriculture result in increase in income of the poorest by twice as much as the same investment in the service (Peacock, 2004). According to Moncumill (2006), the world population is expected to continue increasing into 21st century. There is noticeable food scarcity and food insecurity and a growing concern about feeding a large number of people, many of whom have no permanent employment and have limited access to resources (Todaro and Smith, 2006).

Agriculture has over the years been the largest employer of labour in Nigeria. About 70% of workers in Nigeria were in agriculture in 1996 and this had fallen to only 60% by 2009 (Adedeji, Sheu and Dietrich, 2013). The rate of growth of Nigeria's food production is 2.5% per annum recently, while food demand has been growing at the rate of more than 3.5% per annum due to 2.85% growth rate of population (Kolawale and Ojo, 2007). In Nigeria, apart from socio-economic problems facing Nigerian farmers, there is also effect of climate change which can be seen with incessant flood disaster witnessed in the recent years in some part of the country. Several crops productions fields and farm lands were destroyed, farmers have been experiencing terminal drought in the same production field where flood has occurred (Gana, Maji, Ukwunja, Imolechin and Ogunremi, 2000).

Like in other parts of Nigeria and the world, agriculture in Niger State was practiced in time past at a subsistence level. In recent time, statistics vary on agricultural production, for instance in 2011 major crops produced in Niger State are: yam (2,669,853 metric tons) rice (297,595 metric tons) maize (318,923 metric tons) sorghum (360,599

metric tons) millet (355,999 metric tons) cassava (239,963 metric tons) groundnut (30,397 metric tons) (Niger State Ministry of Agriculture and Rural Development, 2011). These crops are also produced in Gurara Local Government Area (LGA).

Livestock production is also a major agricultural activity undertaken by majority of the people in Niger State. The livestock record of 2007 puts an estimated population of the livestock of the state to be about 1.98 million cattle, 1.6 million sheep, 3.5 million goats, and 6.0 million poultry including chicken, guinea fowl and pigeon as well as about 50,000 rabbits, 200,000 pigs among others. These are largely produced by small holders under local traditional practice. However the average annual production output remains very low compared to the State's potential (Niger State Ministry of Livestock and Fisheries, 2014).

Department for International Development (DFID) (2014) stated that, in Nigeria, small holder farms account for approximately 81% of the total farm holding. The competitiveness with which the agricultural sector used to thrive has virtually disappeared. Supply and use of farm inputs in addition to adequate working capital and infrastructural facilities, modern farm technology and proactive farming policies are all inadequate, while the reduction of income inequality through poverty alleviation programmes has not been enough to guarantee improvement (UNDP, 2006). According to Muhammad (2007) countries in Africa frequently give low priority to agriculture and rural development because they view agriculture as a declining sector.

There are series of constraints on agriculture in Nigeria that prevent it from being a significant contributor to the process of structural change as expected. One of the most important problems is the limited use of fertilizers and improved varieties of crops. Nigeria use approximately 10-15kilograms per hectares of fertilizers, compared to rates between 100-200kg/ha in the most developed nations (Philips, Emphrian, John and Owobowale, 2009). Inadequate funding of agriculture in Nigeria has aggravated rural poverty in Nigeria

(Shiru, 2008), limited storage and processing facilities mean that crops may spoil while waiting, reducing the net value added that is provided (Fade-Aluko, 2007).

Migration which is another factor with severe impact on change in agricultural production has led to a reduction in agricultural labour for many families. Many households in developing countries have experienced out-migration of able bodied persons to urban centres. This has reduced the labour force for agriculture in rural areas and led to a sharp drop in agricultural output in many rural communities (Majid, 2004). Rural-urban migration has been triggered by the presence of urban centres with social amenities, industries and commercial activities. Many people have moved to urban areas in search of gainful employment. Particularly the uneducated migrate to urban areas partly due to boredom in farming (Braun, 2004).

In Gurara LGA, agricultural productions have witnessed fluctuating fortune with upward and downward swing. This has resulted in inconsistency in benefits of agriculture to the farmers and the local government administration. There is a need to understand the changes in order to facilitate continuous agricultural production.

1.2 Statement of the Research Problem

The Nigerian Government has over the years formulated series of agricultural programmes meant to encourage food production but such agricultural programmes have been found inefficient and ineffective by government, when the intended results were not realized. To reach the millennium goal of cutting hunger and poverty, agricultural growth must be put back on top of the development agenda but “business as usual ”approach will not suffice. The factors influencing agricultural production diversification and competitiveness require a thorough analysis to develop better ways to support tomorrow’s agriculture (Nchechuwe and Adejuwon, 2012).

Philips and Adetimirin (2001) in their study, “enhancing the transfer and commercialization of agricultural technologies in Nigeria”, adopted a PRA survey (Participatory Rural Appraisal Method) in the south west zone of Nigeria. The findings are that financing productivity to improve investment is difficult; very few small holders can produce the necessary collateral to obtain loans. They observed that none of the farmers in their sample in Oyo and Ogun states were able to access conventional bank loans to finance farm projects instead they relied on co-operative organizations or friends and family. There are various factors that induce change in agricultural production. For instance, Ojo, Muhammed, Olaleye and Ojo (2009) reported that labour, access to agrochemical and yam seed were found to be significant production factors which accounted for changes in the output of yam in the study areas. The study is only limited to yam production which could be because it is one of the major produce in Gurara local government area.

However, Sule (2011) revealed that drying up of marshland resulted in reduction of crop yield in Bonu village and there is decreasing soil fertility due to the deforestation for firewood. The author concluded that livestock and poultry production in Gurara local government area is facing serious problems such as decreasing pasture land for grazing and widespread of livestock and poultry epidemics which often hamper effective animal rearing.

Gurara LGA is blessed with abundant potential farm land but access to farm inputs such as fertilizer, improved seeds, tractors and extension officers were inadequate. Consequently, this has led to decrease in agricultural production in Gurara local government area. Also, fish production has been on the decrease, for example 2007, 2,500 metric tons were produced, in 2008-2010 it was 2,300 metrics tons, but dropped in 2011-2012 to 1,200 metrics tons (Niger State Ministry of Livestock and Fisheries, 2014). Hence,

there is need for investigation to establish the problem and proffer solution in order to improve the production.

A cursory observation on changes on cereal production by Ismaila, Gana, Tswaya and Dogara (2012) revealed that factors militating against cereal production include; climatic factors, edaphic factors, migration, government policies, use of local varieties, and predominance of weeds, pest and diseases. Solving Nigeria cereal problem is an indirect and powerful approach to alleviate poverty and the improvement of the standard of living for Nigerian farmers. They concluded that there is need to have a systematic collaborative research to find solution to the problems posed.

Audu (2012) in a study titled “descriptive analysis of rainfall for agricultural planning in Lokoja local government area of Kogi State, Nigeria” established a strong relationship between precipitation effectiveness and crop productions. The frequent dry spells occasioned by late onset, early cessation and fluctuation contributed to crop failure. The researcher therefore, proffered the early cultivation of crops especially those which can tolerate long period of absence of rain.

As noted earlier, Wouterse and Taylor (2008) work in Burkina Faso established that international out- migration has a negative effect on income from staple crops but had no effect on cash cropping. Mendola (2002) highlighted that international out-migration led to increase adoption of high yield of some crop varieties but that internal and temporary out migration led to decrease adoption. In most cases, out-migration causes labour scarcity at the origin which is proximate cause of a series of problems. These according to Jokisch and Priblisky (2002) include:

- i. inadequate attention to agricultural and social organization that sustain agriculture
- ii. deleterious effects on the cultural and social organization that sustain agriculture
- iii. poverty of agriculture, innovation or a stagnant agricultural base

- iv. an overburdening of those who remain (usually women) with labour, interfering with the performance of all necessary agricultural tasks

Change in agricultural policy and reform in Nigeria has little positive impact as Daniel and Kanu (2012) reported in their research titled “effects of agricultural reforms on the agricultural sector in Nigeria”. The authors concluded that the effect of economic reforms on the agricultural sector can be said to be unsatisfactory in view of its minimal contribution to the sector. As a result of the neglect of agriculture and the rural areas, Nigeria now import farm products to feed her people with untold hardship on the rural people (Stock, 2005). This could have been influenced by the inefficiency of the e-fertilizer distribution of federal government in Gurara LGA, because few farmers are benefiting. It appears that most of the fertilizers are in the hand of elites and politicians who always divert fertilizers into their commercial stores.

Findings from the studies of Philips and Adetimirin (2001), reveals that farmers’ access to finance to enhance their productivities, which is limited to Oyo and Ogun state. The research of Ojo *et al.* (2009) is also limited to output of yam in the study area. Also Ismaila *et al.* (2012) focused on changes on cereals production but did not cover tuber crop and animal production. Daniel and Kanu (2012) studied the effects of agricultural reforms in Nigeria. The authors concluded that effects of economic reforms on agricultural sector are unsatisfactory with minimal contribution to the sector. It is discovered that most of the researches dealing with aspect of agricultural production mostly emphasized on agricultural policies, technology, reforms, financing, and factors inducing changes in selected crop yields.

The reason for this research on assessment of changes in agricultural production in Gurara LGA is because the recorded changes are decrease in productivity. Considering the importance of agricultural production as basis for economic growth and development in the

study area and Nigeria at large, it is pertinent to find out the causes of this decrease in agricultural productivity in the area. Besides, there are no baseline data or records on the causes of changes in agricultural production in Gurara LGA. It is vital to have such records for agricultural production in the study area. As such there is a gap in knowledge since none of these studies have attempted to assess changes in agricultural production in Gurara local government area. This gap in knowledge is what this research intends to fill. It is against this background that this study is set to assess agricultural productivity in Gurara local government area by addressing the following research questions.

- i. What is the level of agricultural productivity over the years in Gurara LGA?
- ii. What are the factors influencing agricultural productivity in the study area?
- iii. Are their changes in crop and livestock production different over time and space?
- iv. How do farmers perceive the level of agricultural productivity?

1.3 Aim and Objectives of the Study

The aim of this study is to assess agricultural productivity in Gurara Local Government Area of Niger state. To achieve this aim, the objectives set are:

- i. characterize the agricultural productivity over the years in the study area
- ii. describe and determine factors inducing agricultural productivity in the study area
- iii. compare changes in crop and livestock production over time and space in the study area
- iv. establish farmers perception to the level of agricultural productivity

1.4 Research Hypothesis

Based on the aim and objectives of the study, this hypothesis was tested

Ho: There is no significant difference in agricultural production in Gurara local government area.

1.5 Scope of the Study

The study was limited to assessing changes in agricultural production on both crop and animal production in Gurara local government area. The study covered Bonu, Lefu, Tufa, Dikko, Izom and Kabo wards in Gurara local government area. These wards were recognized as distinct in terms of agricultural activities. The selected crops studied were rice, sorghum, groundnut; maize and yam while for animal production were cattle, goats, sheep, pig, poultry and cat fish. The temporal scope of the study was from 2008 to 2012 which is a period of 5 years. This choice of this period was as a result most farmers could not recur their harvest above five years which was discovered during the reconnaissance survey.

1.6 Justification of the Study

The population of Nigeria is growing higher while agricultural production seems to be declining. Hence, there is need to assess factors inducing changes in agriculture production at least at a micro scale. This is because if activities of men such as farming, logging, grazing, hunting, urbanization and other developmental activities induced by the rapidly increased population, have together reduced available agricultural land (Heimlich and Anderson, 2001; Kaya and Curran, 2005). The study determined the level of agricultural productivity in various aspect such as crop production as well as animal husbandry involving the rearing of goats, sheep, poultry and fish production which are all obtainable in Gurara LGA. The findings will be very useful to institutions, government and policy makers in taking prompt decision to promote agricultural productions and economic growth of the state and Nigeria as a country.

CHAPTER TWO

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Introduction

This chapter discussed basic concepts related to changes in agricultural production. In addition to that, it also captures a comprehensive review of the literature related to changes in agricultural production with a view to accommodate the academic contribution of this work.

2.2 Theoretical Framework of the Study

There are models and theories that explain the dynamics of agricultural growth and development. In view of this, the relevant ones for this study are agricultural comparative advantage model and Von Thunen theory of agricultural land use.

2.2.1 Agricultural Comparative Advantage Model

David Ricardo developed the classical theory of comparative advantage in 1817 to explain why countries engage in international trade even when one country's workers are more efficient at producing every single good than workers in other countries. The theory posited what can happen. The principle of comparative advantage as applied to specialization in agricultural production seeks to explain which agricultural activity a region should engage in, in order to have maximum output. It stipulates that total output will be greater when each product is produced by that region which has the lowest opportunity cost. The specialization can only, be possible if individual regions or sovereign nations concentrate in the production of those crops or products which they can produce with the greater relative efficiency and by trading for those goods they can produce efficiently (Gbadegesin, 1993).

Agricultural comparative advantage model place emphasis on lowest opportunity cost and specialization suitable and is applicable in the study area. A ward may produce

more types of crops such as rice, yam, or specific livestock (animal) production due to availability of a specific factors like river, soil etc. If the different wards in Gurara LGA can concentrate in production of those crops or products which they can produce with the greatest relative efficiency and by trading for those commodities they can produce less efficiently, it can promote high agricultural productivity in the study area. The model predicts a positive link between agricultural productivity and economic growth. Thus, it provides a formalization of the conventional wisdom, which asserts that agricultural revolution is a precondition for industrial resolution. For the open economy, however, the model predicts a negative link that is, an economy with a relatively unproductive agricultural sector experiences faster growth.

2.2.2 Von Thunen Agricultural Model

Von Thunen developed the first serious treatment of spatial economics and economic geography in 1826; connecting it with the theory of rent. The Von Thunen model of agricultural land created before industrialization. And he concluded that the cultivation of a crop is only worthwhile within certain distance from the isolated city beyond that, the cost of the land becomes too high, with increasing distances, transport cost also increase, or if there is another product having greater yield or lower transport cost. After a distance from the market (the city) the production of a crop become unprofitable, either because its profits drop to zero or the profits earned by other crops are higher, as calculated by Von Thunen for products having different intensities (cattle, wood, grain, eggs, milk, etc.). For each product, there is a certain distance from the city where its production would be worthwhile.

Von Thunen considered four generalized types of economic and agricultural activities, categorized according to relative economic yield per unit area and perishability or difficulty of delivering products to the market. He made prediction of the distributions

of these activities relative to an isolated urban centre. Assuming the existence of a homogeneous landscape (equal fertility and access to water throughout the area), and isolation of the system (no trade connections with outside states). Von Thunen theorized that the following three factors would affect the spatial distribution of agricultural types namely, more perishable products would be grown closer to market; products with higher economic productivity per land area will be grown closer to market; products that are more difficult to transport will also occur closer to market. Von Thunen's approach was considered in terms of global properties of a city and surrounding areas. A rural planner who buys into this theory might be tempted to effect maximum efficiency through land zoning or some other centrally imposed order (Gbadegesin 1993). Von Thunen's agricultural model emphasised more on distance as a factor of crop cultivation which is in lined with the distance of farm to market as a stimulating factor for high production. The model also highlighted on cultivation of alternative crops that has greater yield or lower transport cost. These facts encourage more research in various areas of endeavours.

2.3 Literature Review

2.3.1 Agricultural Production in Nigeria

In Europe and North America, farm sizes have been increasing on the average, since 1950. However, in Africa, Asia and Latin America, by contrast, farm size declined in the late 20th century (Although for reasons more connected to land redistribution) for centuries, family farms have been the most efficient way to organize agricultural production (Malachy, 2014).

Agricultural production remains the main source of livelihood for most rural communities in developing countries and sub-Saharan Africa in particular. Here, agriculture provides a source of employment for more than 60% of the population and contributes about 30% of gross domestic product (Kandlinkar and Risbey, 2000). Rain fed

farming dominates agricultural production in sub-Saharan Africa covering around 97% of the total ground land and exposed agricultural production to high seasonal rainfall variability (Alvaro, Tingju, Katrin, Richard and Claudia, 2009).

The northern part of Nigeria can guarantee the production of cereals such as soya beans, maize, millet, groundnut, cowpea and cotton while the middle belt and the south have the potential to produce root crops such as cassava, yam, cocoyam and tree crops like plantain, cocoa, as well as maize. In addition to crops the country is also involved in livestock production (cattle, sheep, goat, hen, turkey, and pig) fish, forest and wildlife resources (Daniel and Kanu, 2012). Agricultural production certainly occupies a prominent position in every economy that is aimed at alleviating poverty. However, maximum agricultural productivity can only be achieved when the productive forces are adequately equipped with modern techniques and skills (Ujo, 2005).

Niger State vision (3:20:20) a total of 2.3 million hectares is under cultivation for the production of various food and cash crops annually. It is estimated that there are over 55,000 farming families in Niger State with generally low productivity levels. The level of mechanization of farming activities is low where it is estimated that there are only 150 tractors to serve about 3.3 million farmers. Also, there are only 337 extension agents under the Niger State Agricultural Development Project (ADP) providing extension services to farmers, giving a ratio of one extension agent to 1,600 farmers. There exists only one state veterinary referral centre in the state located in Minna, 19 zonal livestock clinics all of them require rehabilitation. There are over 27,000 fishermen in the state with annual output estimated at about 43,000 metric tonnes.

However, agricultural development is a subset of economic development implies a sustained increase in the level of production and productivity over a reasonable length of time and the subsequent improved well-being of farmers, as reflected in their higher per

capital income and standard of living (Hodder, 2000). Many Africa nations are becoming economic power houses, but without a viable agricultural sector there may not be future for Africa (Adesina, 2014).

2.3.2 Factors Stimulating Positive Agricultural Production

Farmers make decisions about what to grow, what animals to keep, the level and type of inputs and the methods they will use. Their decisions are based upon a range of social, economic and environmental factors which have significant implications for changes in agricultural productions. Also, farmers' attitudes and level of knowledge are also important. Factors that promote high agricultural productivity includes labour, capital, technology, market, soil, diversification and government. In terms of labour, people working on farms may be unskilled labourers or skilled and able to use machinery to have high production. For example in India and Java, farmers use abundant cheap labour instead of machine but in Japan and United Kingdom where labour is expensive, they use machines.

Capital refers to the money the farmer has to invest in the farm, this can be used to increase the amount of inputs into the farm, and yield will rise and create greater profits which can be used for more investment. Also, machines and irrigation are two types of technologies that can increase yield. The counterparts' genetic engineering has allowed new plants to be bred that are drought and disease resistant and give higher yield. Farmers grow crops which are in demand and change to meet new demands. Markets exist and vary throughout the year and farmers change their production to suit them. Fertility soil means high outputs or less inputs of fertilizer as flood plains are good for rice because of alluvial soil.

Diversification is when farmers are encouraged to develop activities out of farming to generate more income. For example some farmers have developed camp site, farm shops

bed, breakfast, and school tours to earn more money. Government influences the farmer's through regulations subsidies and quotas. Government offers advice, training and finance to farmers and build infrastructure, such as; roads, grazing land and land reclamation which can increase yield (Are, Igbokwe, Asadu and Bawa, 2010).

2.3.3 Agriculture and Economic Development

In most African countries, agriculture supports the survival and well-being of up to 70% of the population. Thus for many, their livelihoods are directly affected by environmental changes, both sudden and gradual, which impact on agricultural productivity (Cleveland, 2007). Agriculture is an important sector in the economic development and poverty alleviation drive of many countries. The importance of this sector is more pronounced in developing countries such as Nigeria, where it is a major contributor to employment, food and foreign exchange earned (Adebayo and Okuneye, 2005). Food is an indispensable requirement for proper human development. The effects of agricultural reforms, policies and programmes on the agricultural sector are with respect to the fundamental roles of agriculture which according to Daniel and Kanu (2012) are:

- i. provision of adequate food for a growing population and raw materials for industries;
- ii. provision of an expanding market for non- agricultural products;
- iii. generation of savings for investment in agriculture as well as other sectors and release of surplus or under-utilized resources to other sectors;
- iv. generation of foreign exchange

However, the continuous loss of prime agricultural lands to urban expansion is becoming a worrisome development in view of the role of agricultural land in the provision of food and economic development (Oji-Okoro, 2011). Despite all these problems, agriculture remains Nigeria's second source of natural wealth, after oil. The predominance

of small scale farmers with low and declining productivity helps in maintaining production in the sector (NEEDS, 2004).

Abayomi (2006) noted that agriculture is capable of increasing not only per capital income; reduction of spatial inequalities between rural areas, and the unprecedented mobility of rural-urban migration. Agricultural sector plays significant role in developing economics, as source of basic raw materials for our light industries, the creation of employment opportunities and contributions to the gross domestic product (GDP), (Gollin and Rogerson, 2002). The agricultural sector is seriously viewed as the engine of economic growth and important option for the diversification of Nigeria economy. Therefore, facilitation of agricultural growth can offer a sure pathway out of poverty.

2.3.4 Changes in Agricultural Production

In Nigeria successive administrators since independence in 1960, have introduced a myriad of agricultural development programs and policies aimed at enhancing agricultural productivity to feed the rapidly expanding population, provision raw materials for the agro-industries and for exportation (Ingawa, 2014). However, the situation has changed since the oil boom era in the early seventies, which has made the country to shift attention away from agriculture. Consequently, it is now becoming increasingly difficult to get food on the table of the common man (Babasanya, Balogun, Zungun and Olowohunwa, 2008).

Africa is considered to be the continent most vulnerable to climate change while West Africa is a sub-continent that has been most vulnerable over the last three or four decades (Inter-governmental Panel on Climate Change [IPCC], 2007). The most devastating adverse impact of climate change in Nigeria and other subtropical countries include persistent, drought, flooding, increasing infestation of crop by pests and diseases and consequent rural urban migration, increased biodiversity loss, depletion of wild life,

forest, soil condition and natural resource base (Abaye and Giwa, 2009). Adaptation is the key to preparing for and responding effectively to the impact of climate change.

There has been a sharp decline in timber production due to uncontrolled lumbering, use of wood for fuel and non-planting of replacement trees and the industrial base remains very weak (Emmanuel, 2004). Agriculture which was the main stay of Nigeria's economy prior to the discovery of oil has been relegated to the background leading to the country's mono-economy status. The impact of rural-urban Nigeria is indeed a rapid degeneration of the rural economy leading to chronic poverty and food insecurity (Majid, 2004).

2.3.5 Factors Responsible for the Changes in Agricultural Production

Agricultural production problems are unlimited. As Recardo, Sandra and Enrique (2004) pointed to the fact that the world's population can be divided into two groups, the rich and the poor. The gap between them has been widening and in many cases it has led to worsening condition for the poor segment, whose majority are rural based and engaged in agriculture. The soil in some countries may be outstanding for agriculture but if you do not have a paved road and the nearest place you can purchase a bag of fertilizer is 200km away then the land is not worth a cent (Malachy, 2014).

The principal constraint to the growth of the agricultural sector is the fact that the structure and method of production have remained the same since independence (Ukeje, 2005). The United Nations Food and Agriculture organization (2005) the productivity of Nigeria is farmland to range between low to medium but having the potential to rise from medium to good productivity if properly managed (NPC, 2004). FAO (2005) had remarked that Nigeria was among those nations that were at the moment technically unable to meet their food needs from rain fed production at low level of inputs and appear likely to remain so even at intermediate levels of inputs at some points in time between 2000 and 2025.

Farming systems are mainly small holder-based and agricultural landholdings are scattered. Simple, low input technology is employed resulting in low-output labour productivity. Typical farm sizes range from 0.5ha in the densely populated high-rainfall south to 4ha in the dry north. Unpredictable fluctuations in the prices of various food products have become common features in the nation's economy, a situation that has led to the consumers of agricultural produce paying so much while the producers receive lower prices (Echiberi and Meyeha, 2004). Fakayode, Omotosho, Tsoho and Ajaye (2008) investigated rural infrastructures and agricultural productivity profiles in Nigeria. The result revealed that poor access to infrastructural facilities like health centres, educational institutions, communication gadget and water supply all leads to low agricultural productivity, inadequate storage processing facilities and warehousing facilities are the major causes of heavy losses of agricultural produce as inappropriate on farm storage facilities leads to wastage of the produce (Olukosi, Isitor and Ode, 2007).

Urbanization is a process through which the productive agricultural land, forest, surface water bodies and ground water prospects are being irretrievably lost leading to a drop in agricultural activities (Ukeje 2005 and Tali and Murthy 2012). Other factors limiting the agricultural production in Nigeria include lack of access to loans, illiteracy of majority of Nigerian's farmer's, and cropping systems. Most Nigerian farmers practice mixed cropping which do not permit the use of modern implements or tract as technology and agro-chemicals like herbicides (Ismaila, Gana, Iswaya and Dogara, 2011).

Finally, a critical examination of agricultural reforms and policies and their implement over the years has shown that policy instability, policy inconsistency, lack of policy transparency, poor coordination of reforms as well as poor implementation and mismanagement of policy instruments and high rate of corruption constitute major obstacles to the implementation and achievement of the goals and objectives of agricultural

policies (Daniel and Kanu, 2012). Productivity has not grown sufficiently, due largely to under investment in research and new technology, slow adoption existing improved technologies constraints associated with the investment in climate and lacking infrastructure.

2.3.6 Ways to Improve Agricultural Production

The government in collaboration with the World Bank and other development partners put together a comprehensive Africa Agriculture Development Project (AADP) and the National Fadama Development Project (NFDP) aimed at promoting commercial agriculture in Nigeria through the designs of quality investment programmes. The project aimed at improved outputs among participating small and medium scale commercial farmers and agro-processors objectives with regards to NFDP who were to ensure all year round agricultural production using available Fadama land resources in the country. Its approach was community driven development (CDD) and demand-driven investment with emphasis on social inclusiveness and empowerment of the rural people to take charge of their development agenda. The project focused on increasing sustainably and the income of Fadama users through livelihood diversification programmes and empowerment in terms of capacity building, advisory service and acquisition of useful skills and experiences (Nwachukwu *et al.*, 2008).

The Agricultural policy was launched in 2001, where by the Federal Ministry for Agriculture and water resources (FMAWR) developed a National Food Security Programme (NFSP) for sustainable agricultural development in Nigeria. The NFSP has a holistic approach to addressing all the components of agricultural value chain. It does not only cover an increase production, but also enhanced storage, processing, packaging and marketing. Its objectives were in the short term to improve Nigeria's agricultural productivity. In the medium term, to expand and improve large-scale production, improve

storage and processing capacity as well as develop the required infrastructure to achieved food stability while in the long term, to derive over 50% of the nation's foreign exchange through agricultural export (UNDP, Nigeria, 2010).

Investments in rural infrastructure (particularly rural roads, storage, processing and marketing facilities) along with bank loans will therefore be required to support the anticipated growth in agricultural production (FAO, 2008). Between 2012 and 2014, a total of 14 million farmers received their subsidized farm inputs using electronic vouchers on their mobile phones to directly pay private sector input retails (Adesina, 2014). Therefore, government must provide all the necessary incentives for the extension workers to enable them perform their work effectively.

Farmers' cooperative societies are variously involved in agricultural development. The appeal for the promotion of cooperatives at the grassroots and community levels should be seen as an instrumental strategy towards sustainable rural development now that government cannot be depended upon to meet individual numerous needs (Adefila, 2011).

2.3.7 Review of Empirical Studies

Agboola and Ojeleye (2007) examined the impact of climate change on food crop production in Ibadan. The study adopted both primary and secondary data collection procedures. For the secondary source of data, time series data covering 30 years were collected on climate variables and the analysis was done with bivariate Chi-square and ANOVA supported by graphical illustrations. The study revealed that farmers have noted various changes in climate conditions over the last two to three decades. It was further shown that there has been decline in crop yields on food crop production due to reduction in rainfall and relative humidity and as well as increase temperature.

Jidauna *et al.*, (2012) investigated empirically the effect of climate change on agricultural activities in selected settlements in Nigeria specifically, the Sudano-Sahelian

Region. The study used a structured questionnaire and focus group approaches for data collection procedures and employed inferential statistical technique for the analysis. The study found that rainfall and temperature have been on a decline and increase respectively. The effects are; decline in crop yield that has attracted the application of fertilizers and abandonment of farmlands. Also, Ayinde *et al.*, (2011) examined the effect of climate change on agricultural production in Nigeria and the study covered the period 1980-2002 and adopted time series data. They analyzed their study with the recent co-integration technique of analysis and revealed that temperature had negative effect on agricultural productivity while rainfall was found to exert positive effect on agricultural productivity.

Ifeanyi-Obi and Nnadi (2014) examined climate change adaptation measures used by farmers in South-south Nigeria. This study analyzed the adaption measures used by farmers in South-south Nigeria. One hundred and sixty farmers were chosen for the study through the use of multi stage sampling technique. Interview schedule, structured questionnaire and focused group discussion were used to collect data for the study while descriptive statistics namely; mean, frequency count and percentages were employed to analyze the data. Result shows that 70.6% of the farmers were male, about 50% fall between the ages of 41 and 60 with the mean age as 45years. Majority (80%) of the farmers were married while more than 54% had at least secondary school education. The result also shows that majority (66%) of the farmers earn less than ₦50,000 per month, 83.1% have at least 10years farming experience. The household size had a mean of 6 with about 54.3% having a household size of between 6 to 10 persons. Crop production (64.42%) was found to be the major type of farming activity done by the farmers while 86.8% have both consumption and sale as their major aim of production. The major adaptation measures used by farmers in the zone were planting of different varieties of crop ($M = 3.09$), early harvesting of crops ($M = 3.29$), use of different planting dates for crops

(3.05), use of pest and diseases resistant species of crops (M= 3.02), undertaking of non-farming income generating activities (M = 3.57), increase reliance on farming on family labour to reduce cost of production (M = 3.16), more frequent weeding (M = 3.5), increase planting of cover crops to reduce heat stress on crops(3.00) and use of indigenous knowledge to combat climate change (M = 3.29).

Ammani, Ja'afaru, Aliyu and Arab (2012) assessed Climate Change and Maize Production in Kaduna State. An estimated 80% of the maize crop suffers periodic yield reduction due to drought stress. Drought at flowering and grain filling period may cause losses of 40-90%. This is predicated on the argument that climate change resulted from changes in climatic elements such as rainfall. This study investigated the relationship between rainfall, among other factors, and maize crop production in Kaduna State over a period of 15years. Time series data on aggregate maize production, fertilizer use, and total area under cultivation with the maize crop and annual rainfall in Kaduna State for the period 1990-2005 were collected and analyzed using multiple regression technique. Findings of the study showed that annual rainfall contribute significantly and positively to maize production in the study area in spite of climate change, indicating that climate change has not significantly altered the pattern of rainfall in the study area in such a way as to affect maize production negatively.

A cursory look at the empirical literature shows that the studies focused on the relationship between climate change and some others factors as they affect crop production in Nigeria without determining the extent to which these factors have affected the quantity and quality of both crop and animal production. Besides, these studies did not specify time period and were not conducted in Gurara LGA hence, the need to assess agricultural productivity in Gurara LGA of Niger State.

CHAPTER THREE

STUDY AREA AND METHODOLOGY

3.1 The Study Area

3.1.1 Location and Size

Gurara Local Government Area is one of the twenty five Local Government Areas (LGAs) of Niger State. It is located close to FCT in the eastern part of Niger state. It lies between Latitudes 8° 20' to 9° 30' North of the Equator and between Longitudes 6° 30' to 7° 20' East of the Greenwich Meridian. It is bounded in the east by Tafa LGA, in the south-east by Suleja LGA in the north by Paikoro LGA and in the west by Lapai LGA. It is also bounded in the east-west by Federal Capital Territory (FCT) (Figure 3.1). The local government headquarters Gawu Babangida is located at about 60km away from capital city of the nation (Abuja) and about 70km away from Minna the state capital of Niger state. Finally, the local government area is within north central zone popularly called the middle belt. It covers an estimated area of about 1,126.3 square kilometres (Niger State Department of Budget and Planning, 2006).

3.1.2 Relief and Drainage

Niger state is located on high plains of northern Nigeria (North-central) the physical environment in terms of geology and relief are more or less uniform all over the state. The state is underlain by purely basement complex rocks which cover the greater part of Nigeria including Gurara local government area (Gurara Local Government Council, 2001).

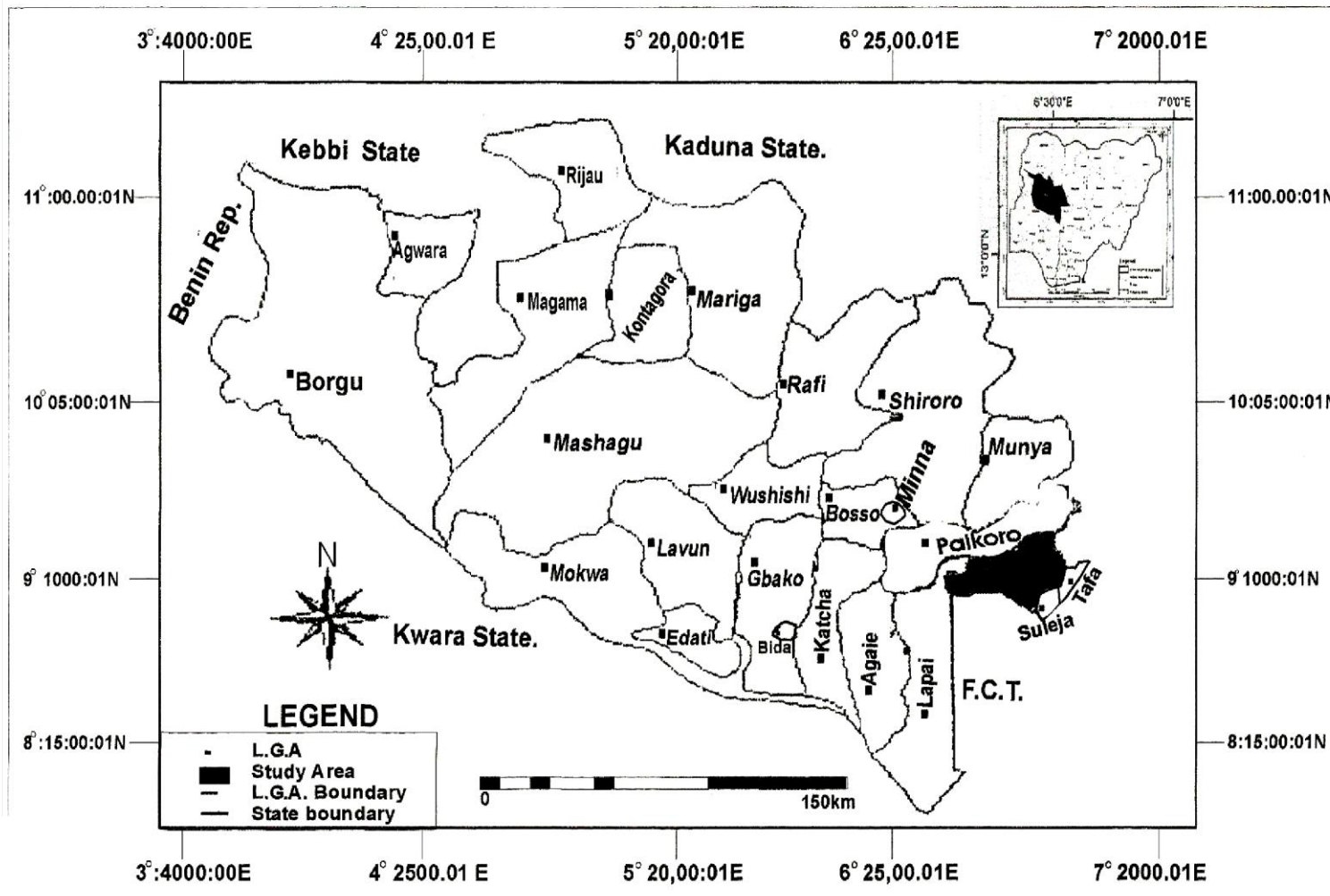
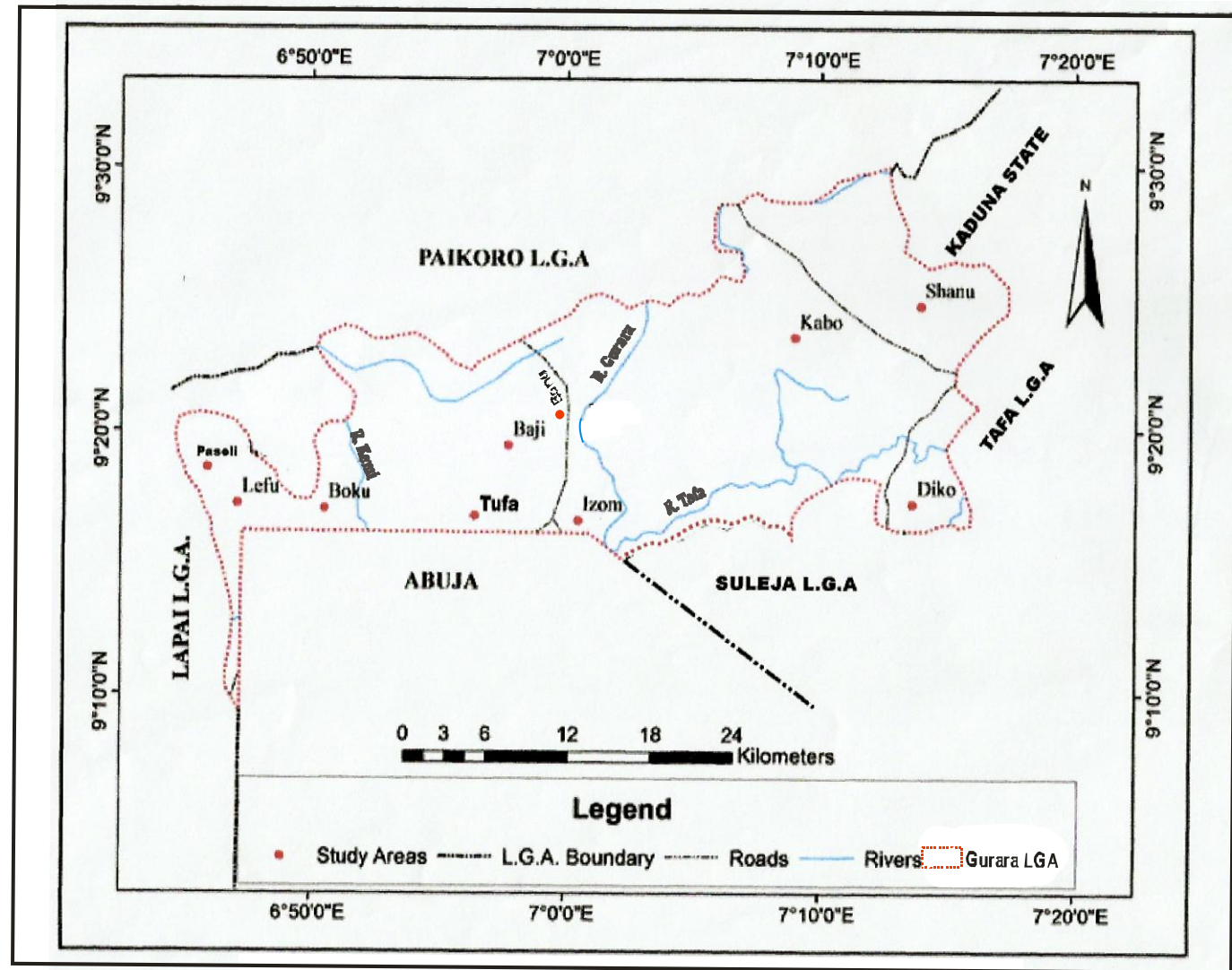


Figure 3.1: Niger State Showing the Study Area
Source: Modified from Administrative Map of Niger State, 2014



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Figure 3.2 Gurara Local Government Area

Source: Adapted from Administrative Map of Gurara Local Government Area

3.1.3 Climate

Gurara Local Government Area is situated in the tropical region with tropical continental climate (Aw) based on Koppen's Classification of Climate. It is characterized by two main seasons, wet season between April to October and dry season between November and March. The mean maximum monthly temperature is highest in March at 30.5°C (85°F). The mean annual rainfall is 1,334mm (Gurara Local Government Council, 2001).

3.1.4 Drainage

Gurara Local Government Area got her name from river Gurara, which its source is from Kachia hills in Kaduna State, North Central high lands of Nigeria. The major rivers that made up the drainage of Gurara LGA are; Burum, Dnabogo, Gbadna, Gurara (major river), Gwachipe, Juami, Kemi, Koko, Kusakpa, Mea'mi and Tafa rivers. The flood plains of these rivers and marsh land (fadama) provide a good land for rice farming and fishing (Gurara Local Government Council, 2001).

3.1.5 Soil and Vegetation

The major soil type in Gurara LGA is ferruginous tropical soil (Frederick, Dada, Garba and Adanne, 2006). The vegetation cover of Gurara LGA is of guinea savannah type (Gurara Local Government Council, 2001). The soil and hydrology permit the cultivation of most Nigerian staple crops and still leaves ample scope of land for grazing, fresh water for fishing and Park Forest (Niger State Ministry of Livestock and Fisheries, 2014).

3.1.6 Population and Economic Activities

The population of Gurara local government area is indigenously and predominantly Gbagyi people and other tribes such as Hausa, Koro, and Kadara. The population of the Gurara local government area as of year 2006 census was 90,974 with a population density

of 81 persons per square kilometre. About 80% of the population engage in agricultural activities especially arable farming. It is worthy to note that immigrant population comprising of Hausa, Ibo, and Yoruba who are traders and labour migrants, are very small and temporary, though some stay permanently (Adamu, 2001).

Generally, the economy of Gurara Local Government Area (LGA) is essentially an agricultural economy with some traditional and local small industries. The LGA has fertile land hence, its ability to produce varieties of food crops and livestock all year round. Though its water reservoirs are yet to be effectively/efficiently utilized for irrigation farming, the LGA is known for the production of rice, sorghum, millet, maize, yam, cassava, fruits like mangoes, bananas, cashew, and oranges are abundant in great quantity (Innocent, 2013). Livestock like chicken, pigeon, pigs, goats, cattle, and sheep are largely produced by small holders under local traditional practice (Niger State Ministry of Livestock and Fishery, 2014). Existing and functional traditional and local small scale industries in the area include, pottery works, art and crafts and weaving. The famous Gurara waterfall in Bonu village is a tourism attraction location from both inside and outside the country (Adamu, 2001).

3.2 Methodology

3.2.1 Reconnaissance Survey

A reconnaissance survey was carried out in order to be acquainted with the study area. Activities carried out during this survey includes, discussion with individuals and groups to establish rapport and make arrangement with them to be involved during the exercise. Field observation of cultivated land and uncultivated land as well as livestock production was also done. This survey helped to determine sample size, select the sampling frame or techniques to be employed in selecting the sampling wards.

3.2.2 Types of Data Used

The types of data used in order to achieve the set objective were:

- i. Socio-economic information of farmers and livestock producers
- ii. The causes of changes in production, types of changes either temporal or spatial and crop or animal production
- iii. Agricultural output over time and space (crop and livestock)
- iv. Information on how people perceive the changes in agricultural production in the study area.

3.2.3 Sources of Data

The research study used data from both primary and secondary sources.

3.2.3.1 *Primary Source of Data*

The primary sources included the use of questionnaire administration and field observation. The questionnaire contained relevant and well-structured questions that were aimed at getting responses that can help in understanding and assessing changes in agricultural production. Focus group discussion (FGD) of 6-7 people in each of the wards selected based on the population of each village: Baji 3 persons and Bonu 3 persons (Bonu ward), Boku 3 persons and Tufa 3 persons (Tufa ward) Diko 6 persons (Diko ward), Izom 6 persons (Izom ward) Kabo 4 persons and Shanu 3 persons (Kabo ward), Lefu 3 persons and Pasalle 3 persons (Lefu ward) was conducted. The FGD took place at village head palace of each village selected to explore issues related to the effect of changes in agricultural production in the study area.

3.2.3.2 *Secondary Source of Data*

The secondary data was obtained from agriculture extension office of Gurara local government council secretariat, Niger State Ministry of Agriculture, Niger State Ministry of Livestock and Fisheries, Niger State Population Commission Minna and 2006 census

result. Other secondary materials which was used for literature review includes: textbooks, journal, conference paper, magazines, newspaper, unpublished thesis, documents and materials from related websites.

3.2.4 Sample Size and Sampling Technique

The population of the study area as at 2006 was 90,974 persons, 2014 projected to 117,046 persons (National Population Census 2009). Therefore, in determining the sample size Krejcie and Morgan (1972) method was adopted which a sampling size of 382 was recommended for a study population of 50,000-75000. To determine the proportion of the respondents in the selected wards the formula below was used.

$$\frac{n}{N} \times 382$$

Where n = ward population

N = Total population of selected wards.

Due to unavailability of present population data, inferred method of population projection was used to obtain the sample size required.

$$P_n = P_o^{e^{rn}}$$

P_n = Expected population

P_o = Base year population

e = Exponential sign

r = Growth rate

n = Number of years interval.

The statistics is given in Table 3.1

Table 3.1: Selected Wards and Number of Respondents

S/NO.	Wards	Selected Wards	1996 NPC Projected Population	2014 projected population	Sample Size	LGA Division.
1	Bonu	Bonu	5,455	9,616	68	GURARA EAST GURARA WEST
2.	Gawu	-	-	-	-	
3.	Lambata	-	-	-	-	
4.	Lefu	Lefu	2,407	4,243	30	
5.	Tufa	Tufa	3,802	6,702	48	
6.	Diko	Diko	6,560	11,566	82	
7.	Izom	Izom	2,292	4,040	29	
8.	Kabo	Kabo	10,021	17,666	125	
9.	Kwaka	-	-	-	-	
10.	Shako	-	-	-	-	
Total			30,537	53,831	382	

Source: Adapted and Modified From NPC, 1996

The wards were selected purposively based on areas where agriculture is practiced predominantly which agree with the findings of (Adamu, 2001). Gurara Local Government Area (LGA) is naturally divided into two parts by river Gurara. The first segment called Gurara West comprises of five wards: Bonu, Gawu, Lambata, Lefu and Tufa wards while the other part (Gurara East) also comprises five wards: Diko, Izom, Kabo, Kwaka and Shako wards. Three wards each were sampled from each part, making a total of six wards out of the 10 wards in the LGA in order to ensure even geographical spread across the LGA (Table 3.1).

A systematic random sampling was used to select ten villages from 36 villages in the study areas due to constraints of time and available resource. The selected ward and villages are the most agriculturally productive settlements of Gurara local government areas and more proximate to urban centres such as Suleja and Abuja (Adamu, 2001). The selected villages are: Baji, Baku, Bonu, Diko, Izom, Kabo, Lefu, Paselle, Shanu and Tufa. However, a rigorous effort was made to ensure the sample village has a spatial spread. The selected wards were assigned questionnaires based on the population of the villages or

wards (Table 3.1). The respondents were purposively selected from each village and questionnaire was administered to households.

3.2.5 Method of Data Analysis

Both descriptive and inferential statistical techniques were employed. The data analysis was done using Statistical Package for Social Sciences (SPSS) version 20. Analysis is done based on objectives as presented.

Objective 1: Characterize the agricultural productivity in the study area.

This was achieved through descriptive statistics such as frequency distribution tables, means and presented in charts and tables.

Objective 2: Describe and determine the factors inducing agricultural productivity in the study area.

This was achieved through descriptive statistics, such as frequency distribution to summaries, in form of tables, graphs, charts and figures.

Objective 3: To compare changes in crop production over time and space and livestock production in the study area.

This was achieved through analysis using t-test and One-Way Analysis of Variance (ANOVA) of comparison at 95% confidence level ($p \leq 0.05$).

Objective 4: Establish Farmers perception to level of agricultural productivity.

Descriptive statistics like percentage distribution tables was used to summarize the farmers' perception to level of agricultural productivity both for crop and animal production in the study area.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter summarizes the socio-economic characteristics of the respondents and analyzed the pattern of change in agricultural production in the study area based on the data collected during the field survey. Similarly, the factors responsible for observed changes and farmers perception on these changes were examined. The results were discussed and presented according to the objectives set for this study.

4.2 Socio-Economic Characteristics of Respondents

Socio-economic characteristics of respondents such as sex, age, marital status, level of education and occupation were examined as shown in Tables 4.1 and 4.2.

Table 4.1: Distribution of Respondents by Sex, Age and Marital Status

Sex	Frequency (N = 382)	Percentage (%)
Male	334	87.4
Female	48	12.6
Age		
Less than 16years	7	1.8
16-30years	115	30.1
31-45years	128	33.5
46-60years	83	21.7
61-75years	49	12.8
Marital status		
Single	89	23.3
Married	276	72.3
Divorced	3	0.8
Widowed	14	3.7

Source: Field Survey, 2015

Table 4.1 shows the distribution of respondents according to sex, age and marital status. The Table 4.1 reveals that majority of the respondents were male with 87.4% percentage while 12.6% were females. This result could be a function of questionnaire administration but also could be due to the fact that farming activities in Nigeria is mostly done by the male as noted by Daniel and Kanu (2012), as such the researcher focused on the male because they were much more available. Age distribution showed that most of the

respondents were within the youthful age as 63.6% of them were between the ages of 16-45years while 34.5% were between the ages of 46-75years. This implies that majority of the reached population in the study area were within the productive ages of 18-40 years as postulated by NPC (2006). This therefore mean more source of labour for the agricultural sector except otherwise. Table 4.1 also revealed that two-third of the respondents was married, three-quarter were never married and one-fifth were divorced and widowed. This could imply that culture still influences marital activities of the area and going by that, there is the prevalence of early marriage in the northern part of Nigeria as a whole as found by NDHS (2005) and the area of study falls within the Northern region.

Table 4.2: Respondents Level of Education, Occupation and Type of Farm holding

Level of education	Frequency (N = 382)	Percentage (%)
Primary	91	23.8
Secondary	130	34
Tertiary	58	15.2
Qu'aranic	24	6.3
None	79	20.7
Occupation		
Crop production	273	71.5
Livestock production	67	17.5
Trader	11	2.9
Civil Servant	31	8.1
Type of farm holding		
Family	239	62.6
Individual	35	9.2
Both	108	28.3

Source: Field Survey, 2015

It is shown in Table 4.2 that a high proportion of the respondents have attained one form of formal education or the other. This therefore implies that the respondents should have a better understanding of the slightest changes in agricultural production and if possible the necessary causes. Table 4.2 further revealed that most approximately ninth-tenth of the respondents were farmers. This is in line with the assertion of Kandlinkar and Risbey (2000) that agriculture provides sources of employment for more than 60% of the population and contributes about 30% of gross domestic product in Africa. Also

agricultural production remains the main sources of livelihood for most rural communities in developing countries like Nigeria. It was also indicated that the area is most likely full of both formal and informal economic activities because about 2.9% were traders while civil servants constituted about 8.1%. The type of farm holding of respondents as revealed from Table 4.2 showed that a larger proportion of the respondents engaged in family farm, 9.2% cultivate their individual farm land and about two-third run both individual and family farm. The high proportion of respondents in the area is not surprising as farming has been an old time occupation in the study area and as such even with white collar jobs many still venture into farming because it is inherited from forefathers. This also explains why majority of the farmers still use family farm.

4.3 Level of Agricultural Productivity in the Study Area

4.3.1 Level of Crop Production

The changes in crop production as perceived by the people and the yield of the various crops such as rice, maize, sorghum, yam and groundnut in relation to the two zones of the LGA as well as the various years covered by the study.

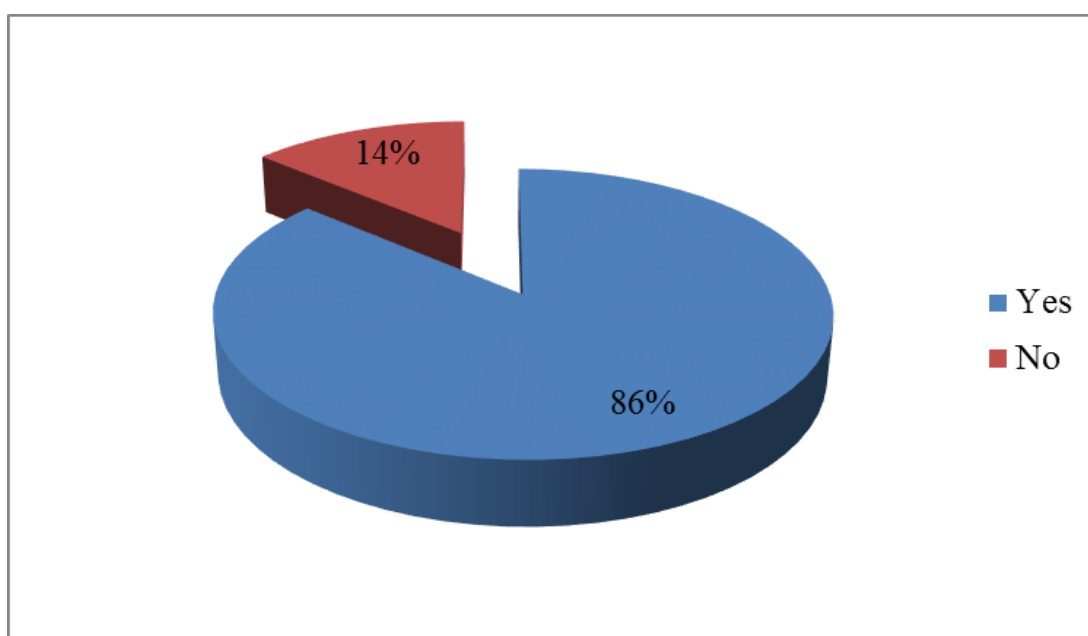


Figure 4.1: Observable Changes in Level of Crop Productivity

Source: Field Survey, 2015

Figure 4.1 reveals that 86% most of the respondents observed changes in crop production in the area, while 14% of respondents opined that they did not observe any change in crop production in the area respectively.

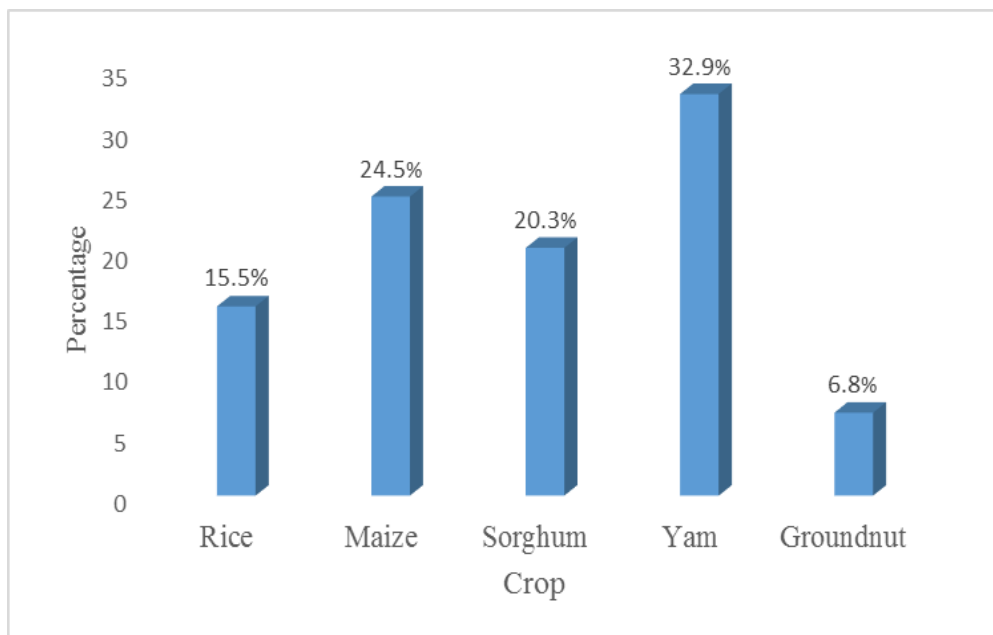


Figure 4.2: Percentage Distribution of Type of Crop Cultivated

Source: Field Survey, 2015

Figure 4.2 illustrates that yam according to 32.9% of the respondents is the most popular crop cultivated by farmers in Gurara, followed by maize accounting for 24.5%, then sorghum 20.3%. The high level of yam cultivation in the study area could be a function of the climatic as well as the ferruginous tropical soil type of the area which supports the cultivation of most Nigerian's crops. Similarly, the area lies very close to the southern part of the country which is known very well for tuber crops cultivation. During the reconnaissance survey, it was observed that most farmers could not recall their harvest figures or records above five years. Therefore, current records start from 2008. The yields of the crops are presented in Figures 4.3, 4.4, 4.5, 4.6, and 4.7 but the real data are presented in Appendix II.

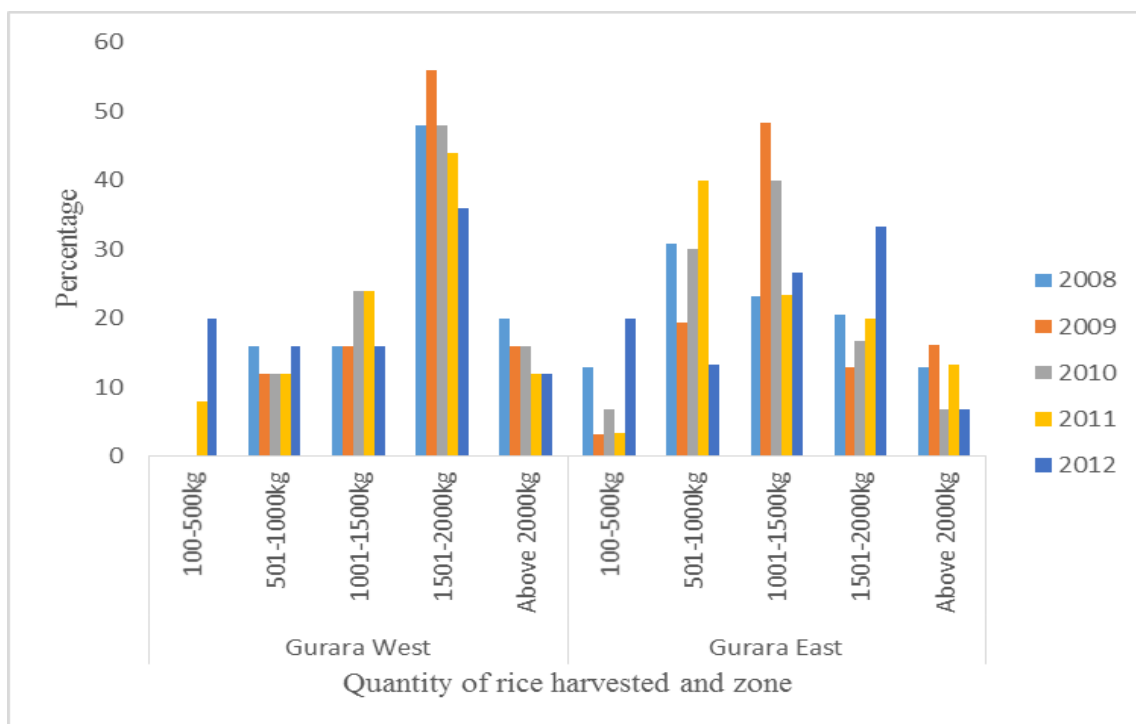


Figure 4.3: Rice Yield among Respondents

Source: Field Survey, 2015

Figure 4.3 shows the distribution of respondents by rice yield according to zones and years. It also reveals that 46.4% of the respondents in Gurara west harvested between 1501-2000kg and the least (5.6%) 100-500kg. While in Gurara east, 31.9% harvest between 1001-1500kg and 9.4% obtain between 100-500kg. Figure 4.3 shows that among the respondents with highest productivity in the two zones, more yield was observed in 2009 with 56% in west and 48.4% in east while the least in the west was in 2012 (36%) and for the east in 2008 (23.1%). This implies that on a general note, rice yield is high in the study area and this could be due to the fact that the soil type of the study area is good for the cultivation of rice like most Nigeria crops as documented by Gurara Local Government Council (2001). Also, the fact that changes in yield of rice is experienced over the years. Given the situation, it means that crop production in the area is affected by some factors which could be climatic or others.

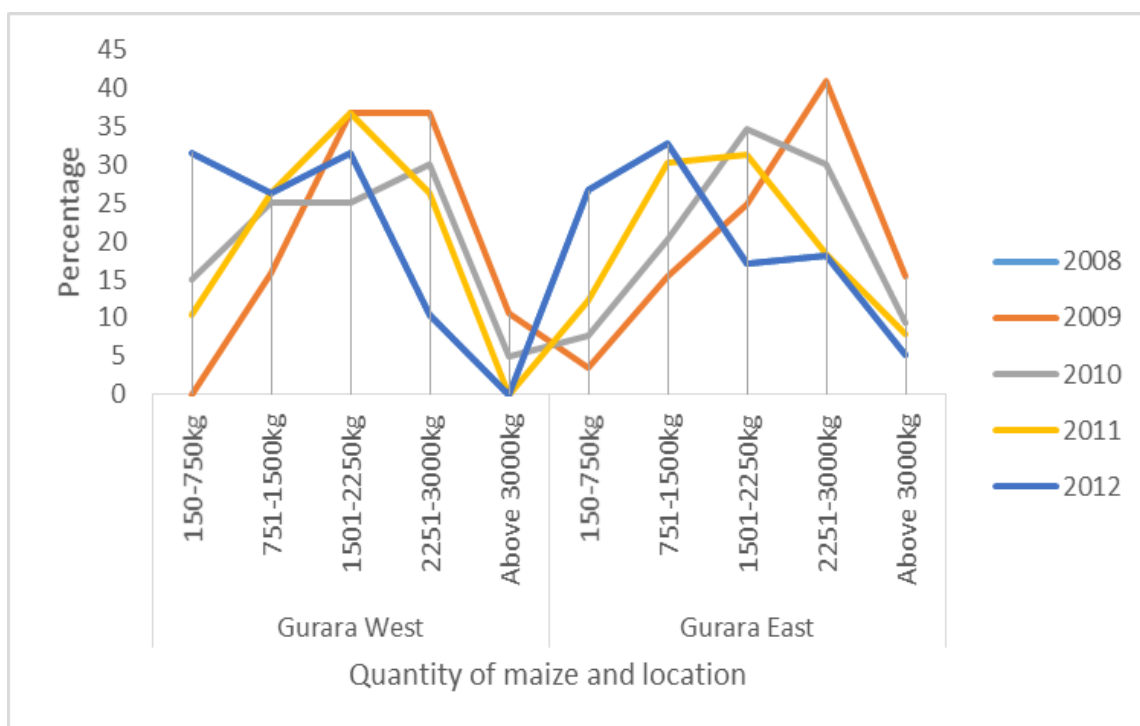


Figure 4.4: Maize Yield among Respondents

Source: Field Survey, 2015

Figure 4.4 shows the distribution of respondents by maize yield according to zone and years. The results indicated that 30.3% of the respondents in Gurara west harvested between 1501-2250kg as the highest while 5.6% representing the least harvested above 3000kg and in Gurara east, 28.5% harvested between 2251-3000kg and (10.4%) had 150-750kg. Figure 4.4 also reveals that among the respondents with highest productivity from the two zones, more yields was observed in 2009 and 2011 accounting for 36.8% in the west and 41.0% in the east. The least in west 16.7% was recorded in 2008 and 18% in east in 2012. This implies that maize yield is also high in the study area and this could be due to the soil type being accommodative to grain crop production like any Nigerian crop types as revealed in records kept by Gurara Local Government Council (2001). Also the changes in yield of maize observed over the years, means that crop production in the area has some determining factors.

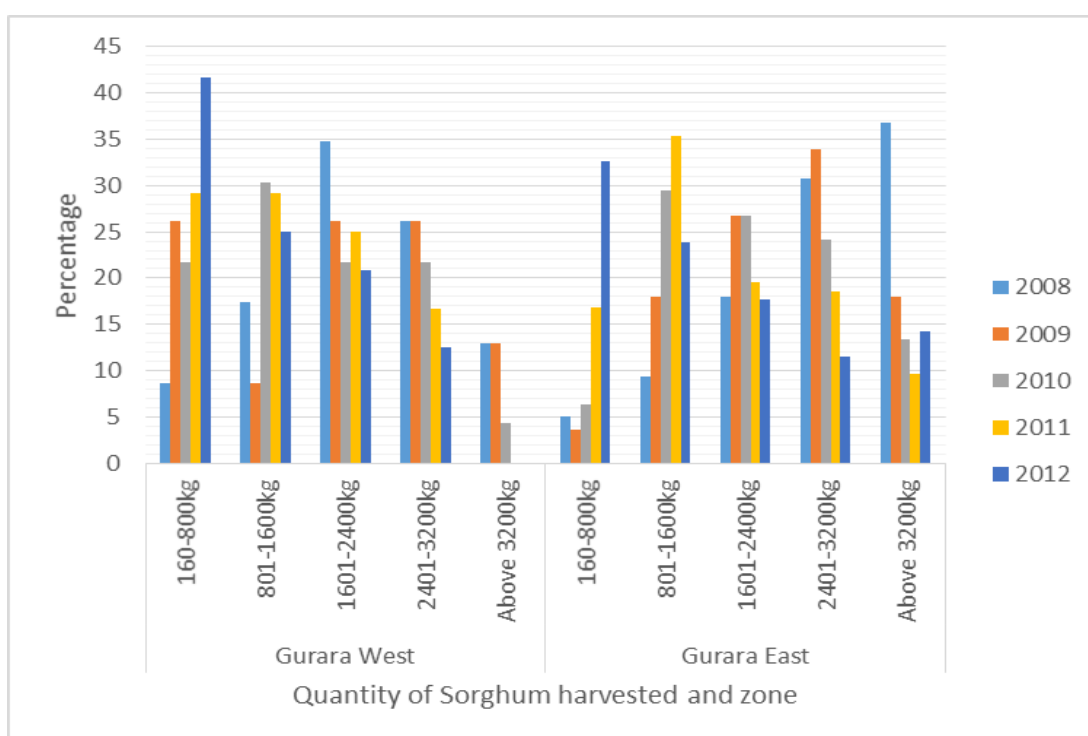


Figure 4.5: Sorghum Yield among Respondents

Source: Field Survey, 2015

Figure 4.5 shows the distribution of respondents by sorghum yield according to zones and years. It reveals that 25.6% of respondents in Gurara west harvested between 1601-2400kg and 160-800kg and 20.5% obtained 1601-2400kg while in Gurara east, 23.8% of the respondents harvested between 1601-2400kg and 12.9% got between 160-800kg. Figure 4.5 also reveals that among the respondents with highest productivity from the two zones, more yield was harvested in 2012 accounting for 41.7% of the respondents in west and in 2009 33.9% in Gurara east while the least in Gurara west was in 2008 with only 8.7% and in 2012 in the Gurara east (11.5%). This not surprising as sorghum is a crop that grows better in the Sudan and Sahel savannah zone of Nigeria.

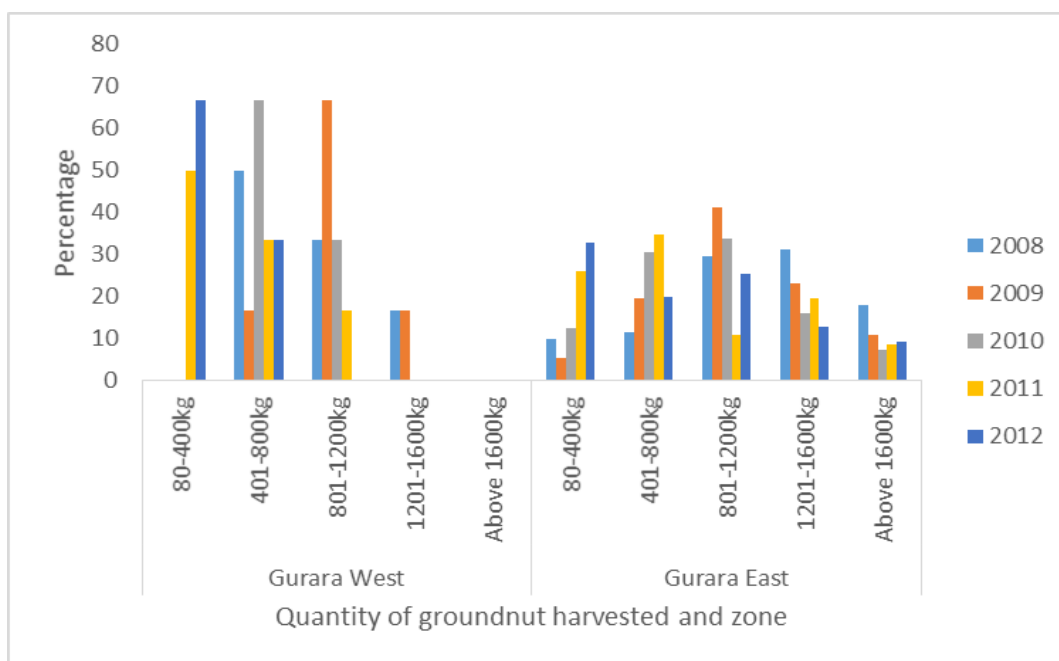


Figure 4.6: Yield of Groundnut among Respondents

Source: Field Survey, 2015

Figure 4.6 shows the distribution of respondents by groundnut yield according to zone and years. It reveals that 40.0% of the respondents in Gurara West harvested between 401-800kg and 6.7% had between 1201-1600kg with no respondent harvesting above 1600kg in the zone. In Gurara East, 71% 1201-1600kg and 10.9% got above 1600kg.

The Figure 4.6 also reveals that among the respondents with highest crop productivity from the two zones, more yield was achieved in 2010 as attested by 66.7% of the respondents in west and in 2009 41.1% in east. While the least in west, it was in 2009. This implies that, groundnut yield is low generally in the study area. This is also not surprising because groundnut is a crop that grows better in the Sudan and especially the Guinea savannah zone of Nigeria. As such, the study area being guinea savannah region may not experience high yield of groundnut due to abundant rain as well as the type of soil in the study area.

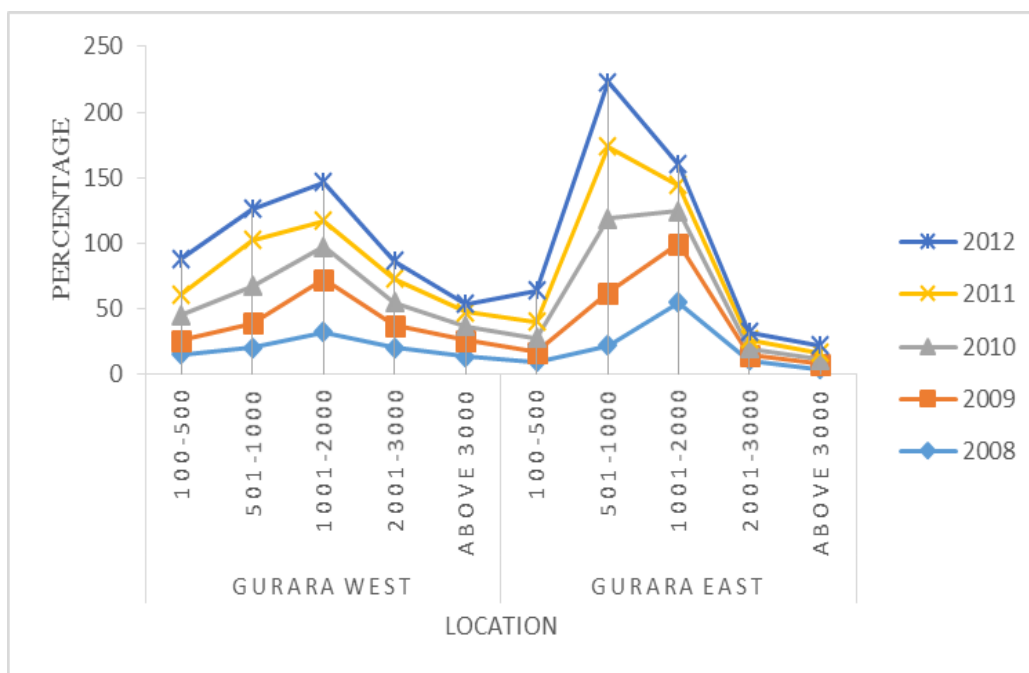


Figure 4.7: Quantity of Harvested Yam Tubers by Respondents

Source: Field Survey, 2015

Figure 4.7 shows the distribution of respondents by volume of yam tubers harvested according to zone and years. It reveals that 73% of the respondents in Gurara west harvested between 1001-2000 tubers while few harvested above 3000 tubers. In Gurara east, on the other hand, 79% harvested between 501-1000 tubers and few harvested above 3000 tubers.

Figure 4.7 also reveals that among the respondents with highest yam production from the two zones in terms of more yield was achieved in 2009 with 40.6% in West and in 2010 56.5% in Gurara east. The least in Gurara west was in 2011 constituting 20.0% and in the Gurara east in 2008 it was 21.8%. During the research, on-the-spot observation of the quality of the yam tubers revealed that most of the yam had greatly reduced both in size and length. This implies that, yam yield is not increasing over the years in the study area. This is surprising because yam is a crop that grows better in the guinea savannah zone of Nigeria as reported by Daniel and Kanu (2012).

4.3.2 Changes in Level of Animal Production

People perception on change in the level of animal production as well as the nature of the Changes in the number of catfish harvested, number of cattle, goat, poultry, sheep and pig were considered as shown in Figure 4.8.

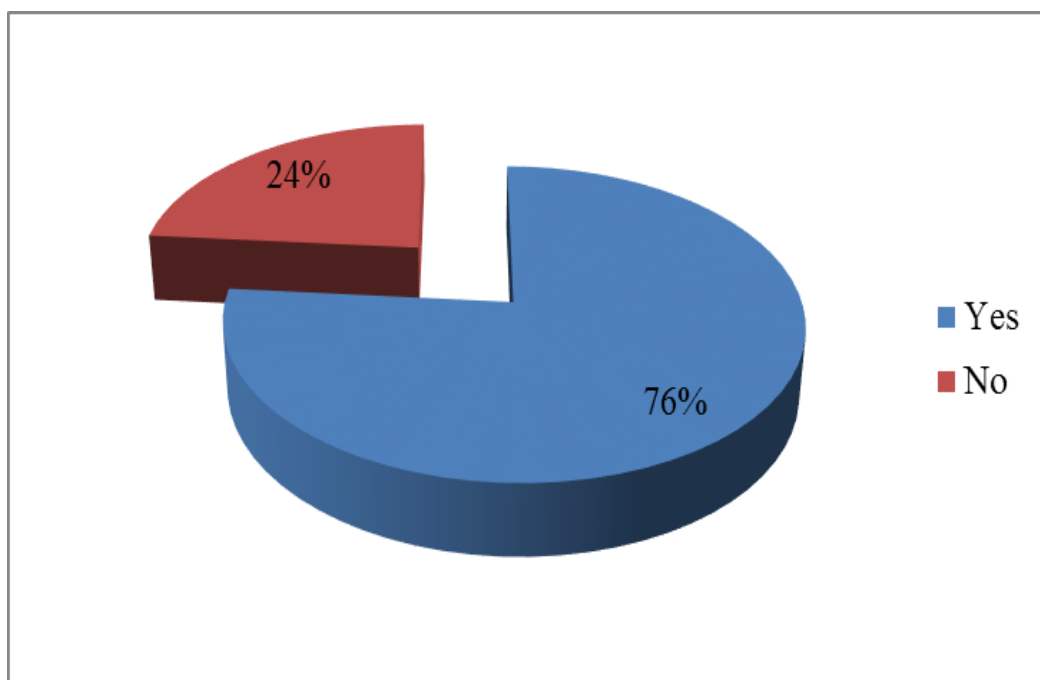


Figure 4.8: Observed in the Level of Animal Production

Source: Field Survey, 2015

Figure 4.8 shows the distribution of the respondent's opinion on changes in animal production in the study area. Over 70% observed changes in animal production in the area, while 24% opined that they did not observe any changes in animal production.

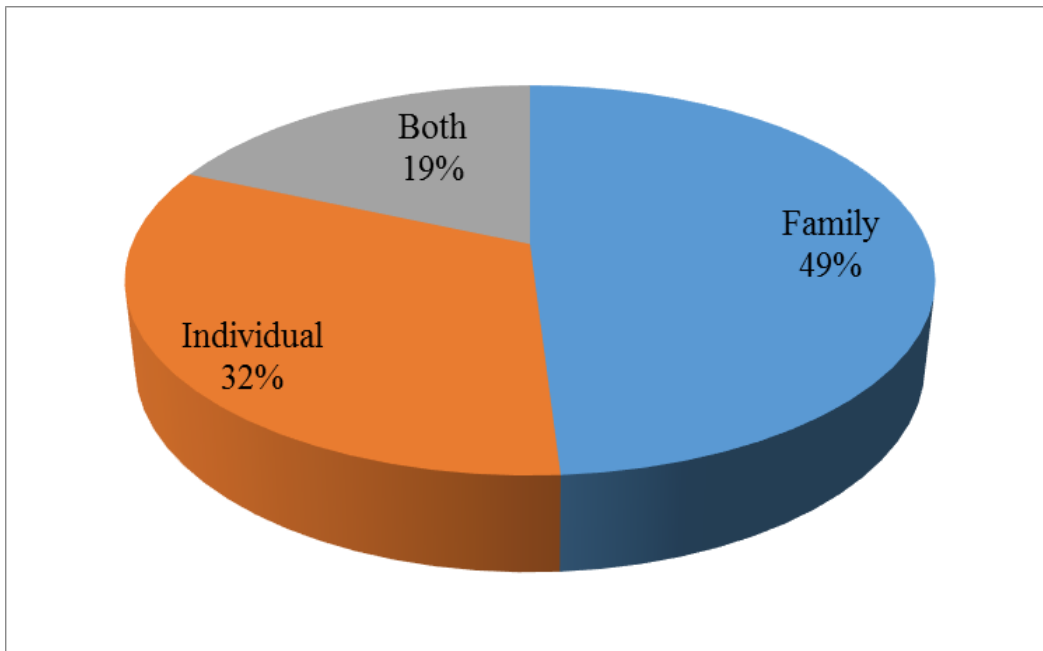


Figure 4.9: Ownership of Livestock/Fish Production Holding

Source: Field Survey, 2015

The type of livestock/fish production holding of respondents as revealed in Figure 4.9 showed that 49% of the respondents run family holding, 32.5% are individual production holding and 18.5% run both individual and family livestock/fish production holding (Figure 4.9). This could mean that good family relationship still exist in the study area as they still hold unto family livestock holding. Also, the fact that agriculture which include animal production is an old practice in the area, makes most of the livestock to be inherited from parents and as such unless divided or shared among the children, it still stands a family holding.

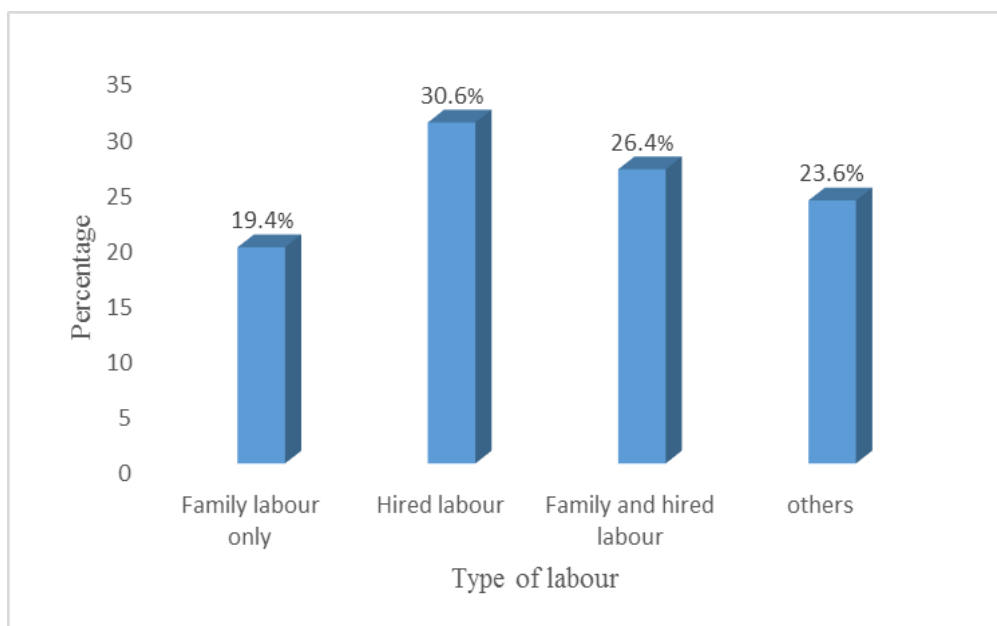


Figure 4.10: Labour Type for Livestock/Fish Production
Source: Field Survey, 2015

Figure 4.10 revealed that about 30.6% of the respondents depended on hired labour only for livestock/fish production, 26.4% used both family and hired labour while 19.4% used family labour only and 23.6% used other forms of labour. This could mean that there is the availability of cheap labour in the study area as such; hired labour would be more preferred. This also could be a function of insufficient machineries for the job as revealed by the Niger State Agricultural Development Project (2010) that there are no adequate farming tools and implements in the State.

Table 4.3: Type of Livestock/Fish Reared and Harvest of Fish

Type of Livestock/Fish Reared	Frequency	Percentage (%)
Catfish	18	25
Cattle	9	12.5
Goat	12	16.7
Poultry	21	29.2
Sheep	5	6.9
Pig	7	9.7
Total	72	100.0
Yield of Fish		
100-1000	16	15.4
1001-2000	21	20.2
2001-3000	26	25
3001 and above	41	39.4
Total	104	100.0

Source: Field Survey, 2015

Table 4.3: showed that 29.2% of the respondents were into poultry production followed by the 25% that were into catfish production while only 9.7% and 6.9% were into sheep and pig rearing respectively in the study area. Table 4.3 also presented the yield of fish among respondents which revealed that most of the respondents produced over 3000 fishes. This could mean that poultry production is the easier animal production in the study area even though fish harvest reveals high production in the study area. The high fish production shows that the area is conducive for fish farming as claimed by the Niger state Ministry of Livestock Fisheries (2014).

Fish harvesting means the catching of mature or grown up fish from the pond/river, this is also refers to fish capturing or cropping pond fish. Harvested fish are presented in kilogram (kg) and a mature fish is not less than one kg called a table size (Udofia, 2014). The common fish and type farmer's rear in the study area is catfish observation on its harvest was conducted and presented on Figure 4.11.

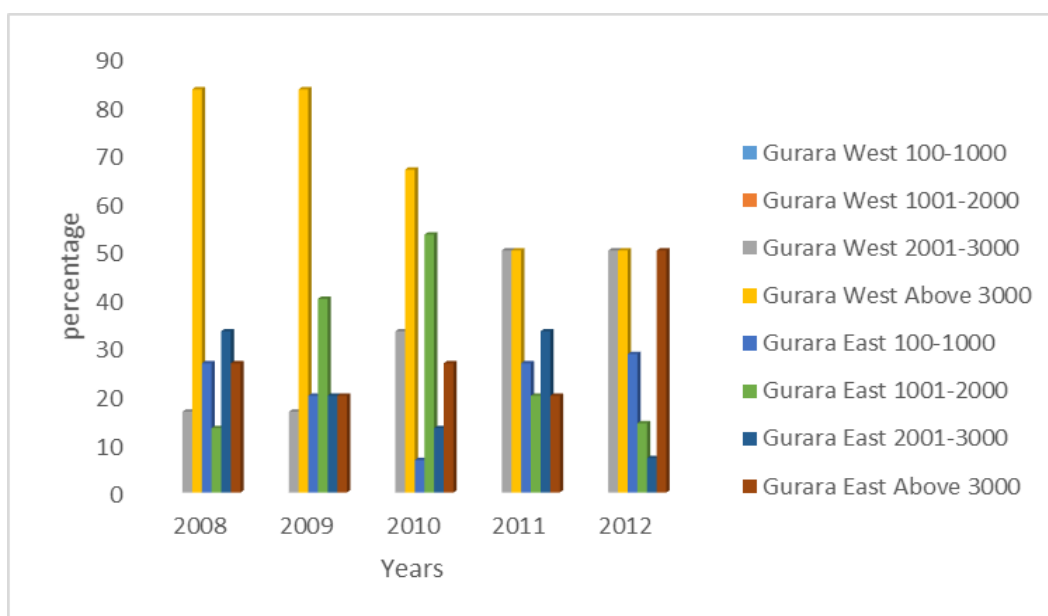


Figure 4.11: Distribution of Respondents by Quality of Catfish Harvested

Source: Field Survey, 2015

Figure 4.11 shows the distribution of respondents by catfish harvested. It shows that majority (66.7%) of respondents in Gurara west harvested above 3000 fishes followed by

33.3% who harvested 2001-3000 fishes. Within the years in Gurara west, in 2008 and 2009 with 83.3% each while the year with the least yield appears to be in 2011 and 2012 with 50.0% each. Figure 4.11 also shows that majority of respondents in Gurara east harvested 1001-2000 fish three-quarter and above 3000 fishes accounting for accounting for 28.4%. This implies that fish harvested is higher in Gurara west than in the east because in the west, there was no respondents with fish harvest of below 2000 fish. This high harvest of fish therefore support the assertion of Niger State Ministry of Livestock and Fisheries (2014), that the soil and hydrology of the state permit the cultivation of most Nigerian's stable crops and still leaves ample scope of fresh water for fishing.

A survey of cattle rearing was observed in the study area and distribution of respondents shown on Figure 4.12.

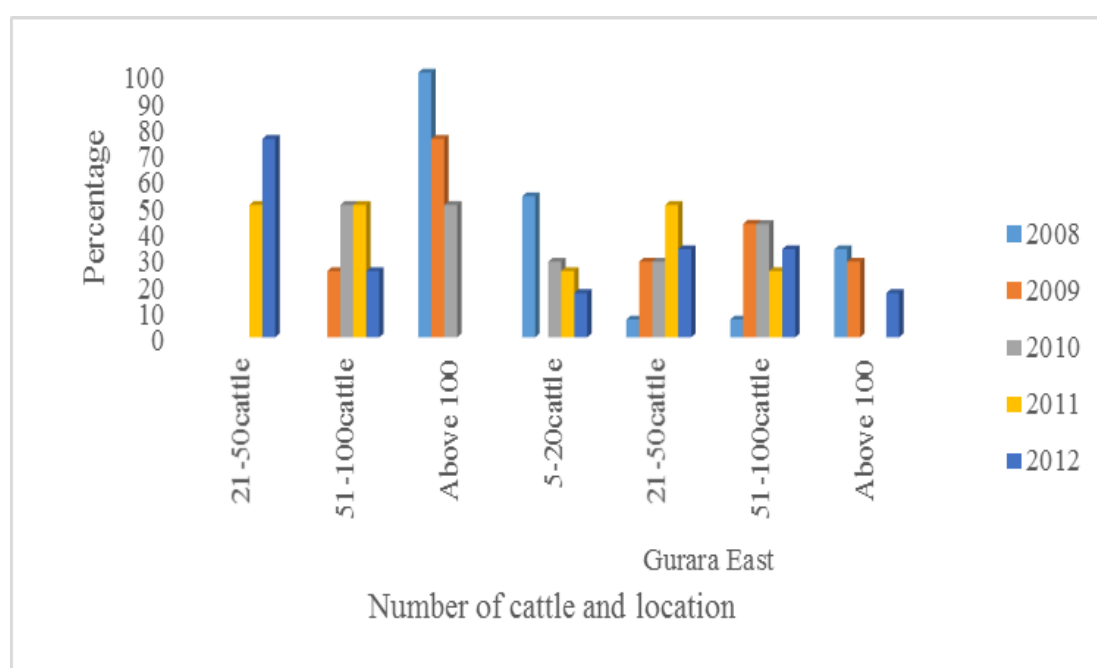


Figure 4.12: Distribution of Respondents by number of Cattle owned

Source: Field Survey, 2015

Figure 4.12 shows the distribution of respondents by number of cattle. It shows that majority of respondents in Gurara west have above 100 cattle heads followed by 30.0% who owned 51-100 cattle. Within the years, 2008 accounting for 100% has the highest

number of cattle in the west while 2011 and 2012 had none each. This reveals that cattle rearing experience a decline in production and a negative change in the area. Figure 4.12 also shows that majority, three-quarter of respondents in Gurara east owned between 5-20 cattle while 18.6% had above 100.

This implies that the number of cattle is higher in Gurara west than in Gurara east. According to four respondents in the course of interview, opined that there was incessant increase in cases of cattle rustling which resulted in negative change in the production in the study area. The soil and water resources permit the cultivation of most Nigerian's stable crops and still leave ample scope of land for grazing, fresh water for fishing and Park Forest (Niger State Ministry of Livestock and Fisheries, 2014) therefore the result of Figure 4.12 about cattle is not surprising although changes are observed in number over the years.

Table 4.4: Percentage Distribution of Respondents by number of Goats

LGA Division	Quantity	2008 (%)	2009 (%)	2010 (%)	2011 (%)	2012 (%)
Gurara	5-20goats			25	50	75
West	21-50goats	50	50	25	50	25
	51-100goats	50	50	50		
	Above 100					
Gurara	5-20goats	6.7	6.7	33.3	60	80
East	21-50goats	26.7	66.7	60	33.3	13.3
	51-100goats	60	26.7	6.7	6.7	6.7
	Above 100	6.7				

Source: Field Survey, 2015

Table 4.4 shows the distribution of respondents by number of goats owned. It shows that 75.0% of the respondents in Gurara west owned between 21-50 goats, while

none had above 100 goats. Within the years in Gurara west, years 2008 and 2009 with 50.0% each had the highest number of goats. The Table 4.4 also shows that 40.0% of the respondents in Gurara east also had 21-50 goats while the least one-ninth has above 100. The finding of the Figure 4.13 implies that goat herding or rearing in Gurara LGA is not highly accommodating. This could be attached to the climate type of the study area and rampant theft of goat in the study area.

An observation of poultry farming by rural people was conducted and it appeared there were no poultry farms as reflected by distribution of respondents presented in Figure 4.13.



Figure 4.13: Percentage Distribution of Respondents number of life birds (Poultry)
Source: Field Survey, 2015

Figure 4.13 shows the distribution of respondents by number of life birds it produced. It shows that majority of respondents in Gurara west have 51-100 chickens (local breeds). Figure 4.13 also shows that 51% of the respondents in Gurara east between years 2008-2012 had 5-20, 21-50 and 51-100 chickens with 30.8% each. Among all reared animals, poultry is one of the most adaptive animals to most types of climate and has a

progressive change of production over time and space. As such poultry in Gurara LGA is common even though the production rate is on the average as revealed in. This implies that the inhabitants of Gurara LGA are really diversified in agricultural activities.

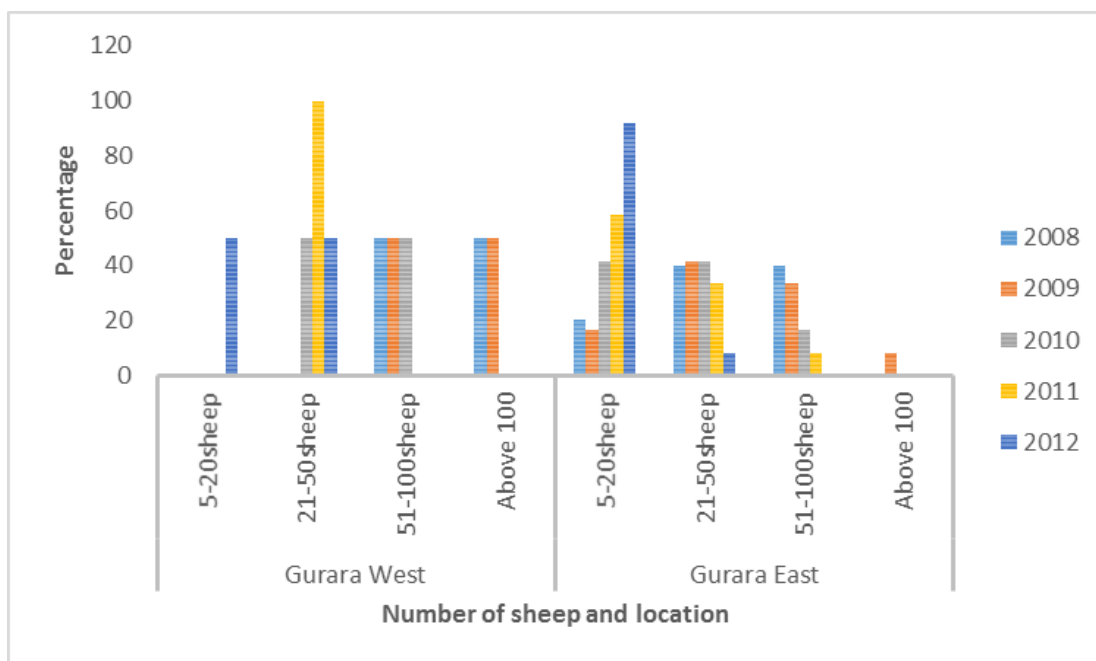


Figure 4.14: Distribution of Respondents by Number of Sheep

Source: Field Survey, 2015

Figure 4.14 shows the distribution of respondents by number of sheep. It shows that 8% of the respondents in Gurara west have 21-50 sheep while 9.1% had 5-20 sheep. Within the years in Gurara west, 2011 (100.0%) have the highest number of sheep (5-20). Figure 4.14 also shows that 91% of respondents in Gurara east had 5-20 sheep while the least (1.9%) had above 100. This implies that many respondents rear more sheep in the Gurara west than Gurara east in the study area and as such has a negative change in production.

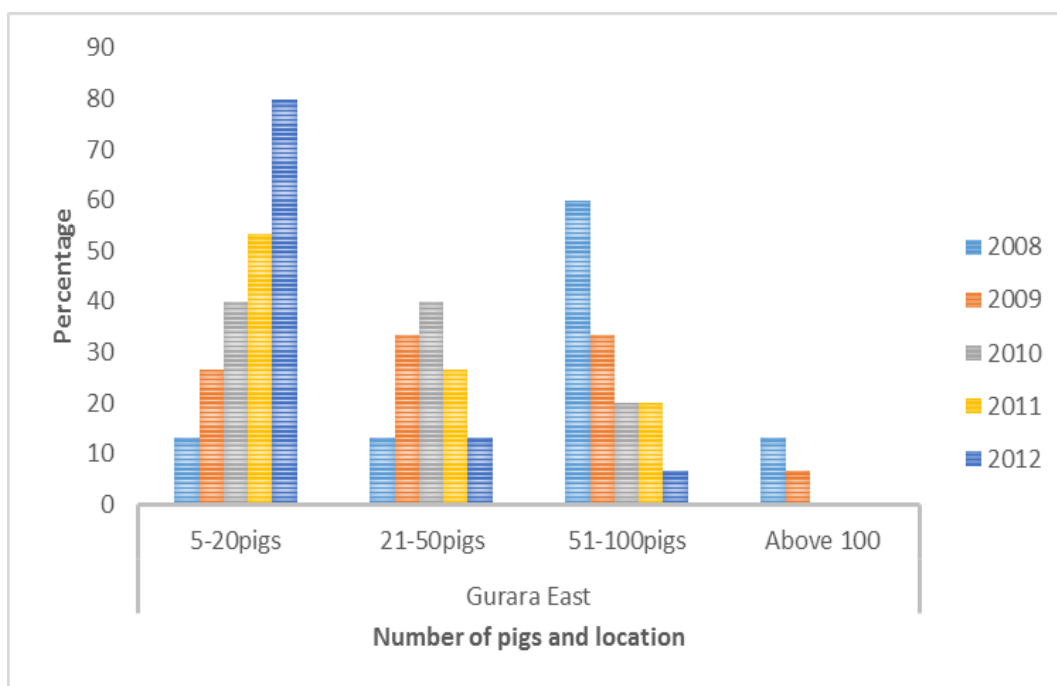


Figure 4.15: Distribution of Respondents by Number of Pigs

Source: Field Survey, 2015

Figure 4.15 shows the distribution of respondents by number of pigs. It shows that in Gurara west, there has not been pig rearing from 2008 to 2012. Figure 4.15 also shows that 42.7% of the respondents in Gurara east had between 5-20 pigs and only 6.7% had above 100 pigs. This therefore implies that in Gurara LGA as a whole, pig rearing is not common. This could be due to several factors in which religion can be part of it.

4.4 Factors Inducing Agricultural Productivity

The perceived factors that induced agricultural productivity according to respondents were examined here. Results of the investigation with regards to the pattern of the change, perceived reason for the change, climate and access to various farm inputs is represented by Table 4.5.

Table 4.5: Increase and Decrease Quality and Quantity Factors in Crop Production

Factors	Quality Crop Production		Quantity Crop Production	
	Frequency	%	Frequency	%
Favourable climate	4	11.8	4	13.3
Adequate extension workers	2	5.9	1	3.3
Adequate inputs	3	8.8	3	10.0
Adequate access to land	18	52.9	16	53.3
Reduce disease and pest	7	20.6	6	20.0
Total	34	100.0	30	100.0
Decrease Quality Factors				
Unfavourable climate	19	15.2	10	11.9
Inadequate extension workers	33	26.4	22	26.2
Inadequate inputs	17	13.6	12	14.3
Inadequate access to land	9	7.2	7	8.3
Disease and pest	47	37.6	33	39.3
Total	125	100.0	84	100.0

Source: Field Survey, 2015

Table 4.5 illustrates that over 50% of the mentioned adequate access to land as one of the factors responsible for increase in quality or quantity of crop production in the area. It was noted 37% indicated disease and pest incidences a factor for decrease in quality or quantity of crop production while the least contributing factor is adequate extension workers which accounted for 5.9% and 26.4% respectively.

Table 4.5 further reveals the factors responsible for the changes observed by the respondents for either increase in quantity or decrease in quantity of crop production in the area respectively. It was observed that adequate access to land with 53.3% is the major factor for increase in quantity, followed by reduced disease and pest with 20%, while the least contributing factor is adequate extension workers which accounts for 3.3% respectively.

Also, it was revealed that diseases and pests are the major contributor to the decrease in quantity of crop production in the area as it accounts for 39.3%, followed by inadequate extension workers with 26.2%, while the least contributing factor was inadequate access to land with 8.3% respectively. This supports the revelation of Abaye

and Giwa (2009) who revealed that the most devastating adverse impacts of climate change in Nigeria and other subtropical countries includes persistent decrease in crop yield. Given this, it could mean that Gurara LGA the agricultural development project of the state has started making impact.

4.4.1 Reason for Change in Level of Animal Production

Table 4.6 indicated the various reasons identified by the respondents for changes in animal production in the study area.

Table 4.6: Reasons for Changes in Animal Production

Reason	Frequency	Percent (%)
Climatic condition	11	20.0
Extension Services	5	9.1
Quality of input	9	16.4
Access to land	18	32.7
Reduction in disease and pest	12	21.8
Total	55	100.0

Source: Field Survey, 2015

Table 4.6 reveals the over 30% of the respondents noted that access to land was a major reason for change in animal production, followed by reduction of disease and pest attack accounting for 21.8%, while 9% of them indicated extension services which seems to be the least.

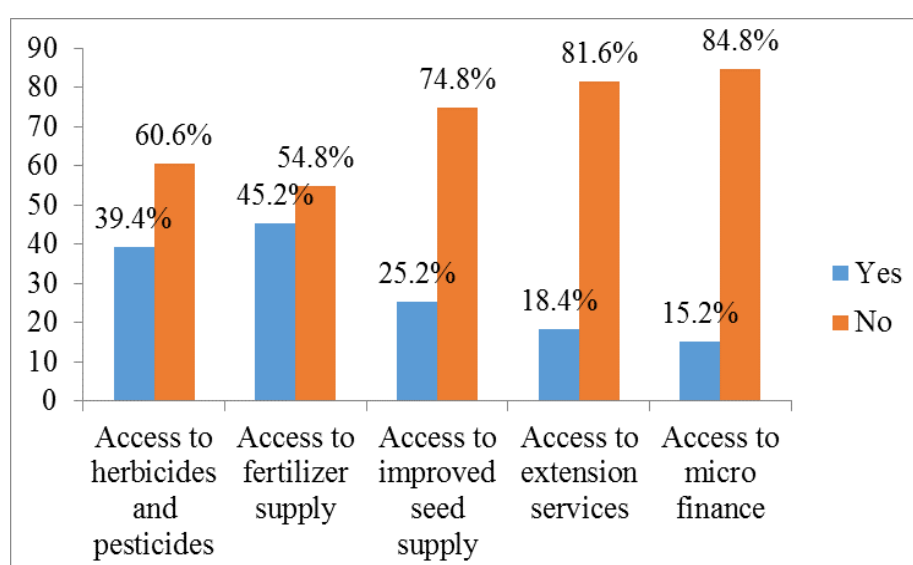


Figure 4.16: Respondents Access to Farm Inputs, Extension Services and Micro-finance

Source: Field Survey, 2015

Figure 4.16 revealed that over 80% of the respondents had access to extension services and micro finance. While over 60% had no access to herbicides and pesticides, and 54.8% had no access to fertilizer. Given these responses, this implies that support to farmers in the area with respect to accessibility to farm inputs was very low. This corroborates the opinion of Malachy (2014) that although the soil in some countries might be outstanding for agriculture, yet lack of paved road and the nearest place you can purchase a bag of fertilizer then the land is not worth a cent. It therefore means that without accessibility to farm inputs, farming is near to impossible.

Table 4.7: Access to Farming Inputs and Services

Access to Feeds	Frequency	Percentage (%)
Yes	44	61.1
No	28	38.9
Total	72	100
Access to Insecticides and Pesticides		
Yes	27	37.5
No	45	62.5
Total	72	100
Access to Improved Varieties		
Yes	31	43.1
No	41	56.9
Total	72	100
Access to Veterinary Services		
Yes	21	29.2
No	51	70.8
Total	72	100

Source: Field Survey, 2015

Table 4.6 revealed that 61% of the respondents agreed that they had access to feeds, 62.5% opined that they had no access to insecticides and pesticides, above 50% claimed that they don't have access to improved varieties, and 70.8% claimed not to have access to veterinary services. With all these lack of accessibility to vital farm inputs, the farm produce is expected to be low. This is in line with the findings of Fakayode *et al.*, (2008) that inputs into rural agriculture in Nigeria are poor and as such it can lead to low agricultural productivity. Ismail *et al.*, (2011) also added that other factors limiting the agricultural production in Nigeria include lack of access to loans.

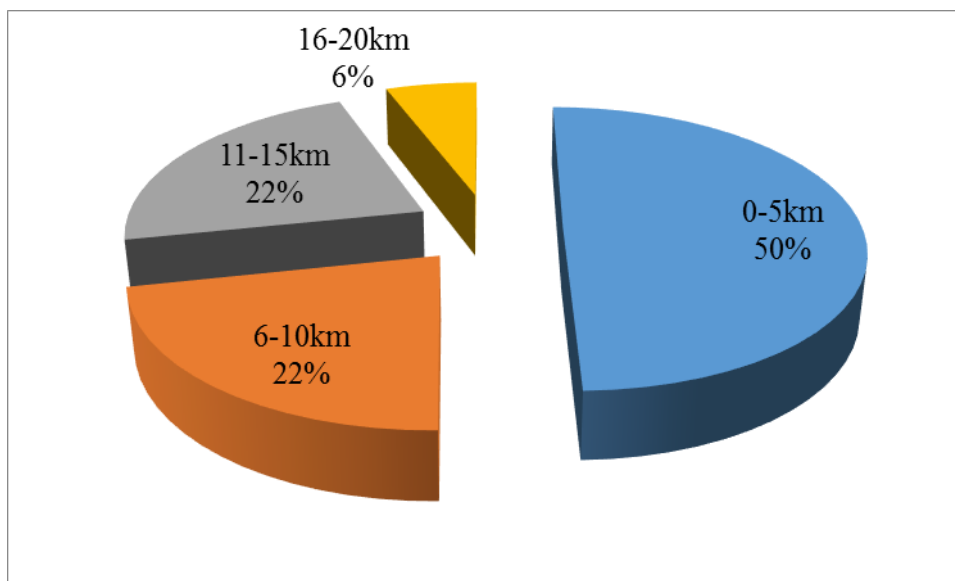


Figure 4.17: Perception of Farmers to the Nearest Market

Source: Field Survey, 2015

Figure 4.17 revealed that for 50% of the respondents mentioned that, the distance of farm to the nearest market was 0-5km, while 22.0% and 22.5% indicated the distance between 6-10km and 11-15km respectively while only 6% had a distance of 16-20km from farm to the nearest market. This implies that accessibility to market as a factor of decreasing productivity in farming is not actually an issue in the study area as such produce should even be more.

4.5 Changes in Crop and Animal Production Over Time and Space

It is expected that over time and space change must occur in both crop and animal production either negatively or positively. Therefore the changes in crop and animal production both over time and space in the study area is examined as shown in the Tables 4.8-4.13.

Table 4.8: Independent Sample T-test of Crop Yield by LGA Division

Crop Type	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	Df	Sig.	Mean	Std. Error	95% Confidence Interval	of the
					(2-tailed)	Difference	Difference	Lower	Upper
Rice	.035	.852	4.259	283	.000	2.646	.621	1.423	3.869
			4.291	273.340	.000	2.646	.617	1.432	3.860
Maize	1.284	.257	-1.917	673	.056	-1.232	.643	-2.495	.030
			-2.001	121.866	.048	-1.232	.616	-2.452	-.013
Sorghum	.153	.696	-3.921	682	.000	-2.400	.612	-3.602	-1.198
			-3.947	168.448	.000	-2.400	.608	-3.601	-1.200
Groundnut	4.982	.026	-2.828	302	.005	-3.106	1.098	-5.267	-.945
			-3.519	40.861	.001	-3.106	.883	-4.889	-1.323
Yam	32.709	.000	5.639	965	.000	301.390	53.447	196.505	406.276
			5.034	411.073	.000	301.390	59.866	183.708	419.073

Source: Field Survey, 2015

An independent samples t-test was performed on the data to examine whether there was a significant difference between yields of selected crops across the study area. The test revealed a statistical significant difference for crops such as rice ($t = 4.259$, $df = 283$, $p < .000$), sorghum ($t = -3.921$, $df = 682$, $p < .000$), groundnut ($t = -3.519$, $df = 40.861$, $p < .001$) and yam ($t = 5.034$, $df = 411.073$, $p < .000$) while there was no significant difference in maize yield ($t = -1.917$, $df = 673$, $p < .056$) between the LGA Divisions. The differences noticed could be a function of factors such as farm inputs, size of farm land as well as specie or variety of crops cultivated by the farmers in the two division of the LGA. Despite

these possible causes of the differences, maize yield still shows no differences between the divisions of the LGA.

Table 4.9: Variation in Crop Yield across the Wards ANOVA

Type		Sum of Squares	df	Mean Square	F	Sig.
Rice	Between Groups	1022.115	5	204.423	7.995	.000
	Within Groups	7133.654	279	25.569		
	Total	8155.768	284			
Maize	Between Groups	1526.488	5	305.298	10.068	.000
	Within Groups	20255.443	668	30.323		
	Total	21781.930	673			
Sorghum	Between Groups	1151.951	5	230.390	6.456	.000
	Within Groups	24193.570	678	35.684		
	Total	25345.520	683			
Groundnut	Between Groups	485.623	5	97.125	3.008	.011
	Within Groups	9621.137	298	32.286		
	Total	10106.760	303			
Yam	Between Groups	40262473.273	5	8052494.655	14.809	.000
	Within Groups	522537108.336	961	543743.089		
	Total	562799581.609	966			

Source: Field Survey, 2015

A one-way ANOVA was also performed to examine whether there were statistical significant differences between the wards in the study area in relation to the yield in different crop type. The results revealed statistically significant differences among the wards for rice $F(5, 279) = 7.995, p = .000$; maize $F(5, 668) = 10.068, p = .000$; sorghum $F(5, 678) = 6.456, p = .000$; groundnut $F(5, 298) = 3.008, p = .011$ and yam $F(5, 961) = 14.809, p = .000$. This implies that within the wards of the study area, crop yield varies. The variation could be due to variation in farm inputs available and affordable to farmers which depending on their varying capacities.

Table 4.10: Yearly Variation in Crop Yield ANOVA

		Sum Squares	of df	Mean Square	F	Sig.
Rice	Between Groups	135.005	4	33.751	1.178	.321
	Within Groups	8020.764	280	28.646		
	Total	8155.768	284			
Maize	Between Groups	4004.341	4	1001.085	37.667	.000
	Within Groups	17806.569	670	26.577		
	Total	21810.910	674			
Sorghum	Between Groups	3453.291	4	863.323	26.776	.000
	Within Groups	21892.230	679	32.242		
	Total	25345.520	683			
Groundnut	Between Groups	1054.007	4	263.502	8.703	.000
	Within Groups	9052.753	299	30.277		
	Total	10106.760	303			
Yam	Between Groups	19266999.827	4	4816749.957	8.525	.000
	Within Groups	543532581.782	962	565002.684		
	Total	562799581.609	966			

Source: Field Survey, 2015

A one-way ANOVA was performed to examine whether there were statistically significant differences in crop yield across the selected years in the study area. The results revealed statistically significant differences across the years for maize $F(4, 670) = 37.667$, $p = .000$; sorghum $F(4, 679) = 26.776$, $p = .000$; groundnut $F(4, 299) = 8.703$, $p = .000$ and yam $F(4, 962) = 8.525$, $p = .000$ while in rice it was not significantly different $F(4, 280) = 1.178$, $p = .321$.

The observed significant differences in crop yield over the study years indicates the changes in crop production in the study area which generally shows a decline in crop production except for rice that is just stable. All the observed changes in crop production right from the differences between the divisions, differences between the wards and over the years could be attributed to climatic changes in the area as Maikasuwa and Ango (2013) also pointed that climate change varies between regions and that the worst-hit in Nigeria are crops because it is severe in the tropics which the nation happens to fall within.

Table 4.11: Independent Sample T-test of Livestock Changes by LGA Division

Livestock	Levene's Test for Equality of Variances		t-test for Equality of Means							
	F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Interval Difference	Lower	Upper
Catfish	79.82	.000	5.179	102	.000	897.04	173.19	553.52	1240.57	
			7.664	92.53	.000	897.04	117.04	664.61	1129.48	
Cattle	6.51	.013	3.007	61	.004	26.14	8.69	8.76	43.53	
			3.268	45.93	.002	26.14	8.00	10.04	42.25	
Goat	.40	.528	.686	93	.494	4.27	6.23	-8.10	16.64	
			.673	29.21	.506	4.27	6.35	-8.71	17.25	
Poultry	.09	.770	2.287	119	.024	14.49	6.34	1.94	27.04	
			2.255	48.39	.029	14.49	6.43	1.57	27.41	
Sheep	.65	.425	2.085	40	.043	18.29	8.77	.56	36.03	
			2.069	14.90	.056	18.29	8.84	-.56	37.15	

Source: Field Survey, 2015

An independent sample t-test was conducted to examine whether there was a significant difference in livestock production across the LGA Divisions in the study area. The result of the test revealed a significant difference for catfish ($t = 7.664$, $df = 92.53$, $p < .000$), cattle ($t = 3.268$, $df = 45.93$, $p < .002$), poultry ($t = 2.287$, $df = 119$, $p < .024$) and sheep ($t = 2.085$, $df = 40$, $p < .043$) while there was no significant difference for goat ($t = .686$, $df = 93$, $p < .494$) between the LGA Divisions. The differences noticed could be a function of factors such as farm inputs, size of farm as well as breed of livestock reared by the farmers in the two division of the LGA. These possible causes of the differences notwithstanding goat number still show no differences between the divisions of the LGA.

Table 4.12: Livestock Changes across the Wards by ANOVA

Type		Sum of Squares	df	Mean Square	F	Sig.
Catfish	Between Groups	26514381.164	5	5302876.233	9.285	.000
	Within Groups	55972393.596	98	571146.873		
	Total	82486774.760	103			
Cattle	Between Groups	17338.688	4	4334.672	4.577	.003
	Within Groups	54933.026	58	947.121		
	Total	72271.714	62			
Goat	Between Groups	4152.701	4	1038.175	1.759	.144
	Within Groups	53106.183	90	590.069		
	Total	57258.884	94			
Poultry	Between Groups	8164.404	5	1632.881	1.798	.119
	Within Groups	104410.406	115	907.917		
	Total	112574.810	120			
Sheep	Between Groups	2952.046	3	984.015	1.622	.200
	Within Groups	23059.573	38	606.831		
	Total	26011.619	41			
Pig	Between Groups	2.407	1	2.407	.003	.958
	Within Groups	62377.540	73	854.487		
	Total	62379.947	74			

Source: Field Survey, 2015

A one-way ANOVA was performed to examine whether there were statistical significant differences among the wards in the study area in relation to the livestock production. The results revealed statistical significant differences among the wards only for catfish $F(5, 98) = 9.285$, $p = .000$; cattle $F(4, 58) = 4.577$, $p = .003$ while no significant different was observed for goat $F(4, 90) = 1.759$, $p = .144$; poultry $F(5, 115) = 1.798$, $p = .119$; sheep $F(3, 38) = 1.622$, $p = .200$ and pig $F(1, 73) = .003$, $p = .958$. The variation in catfish and cattle could be due to variation in farm inputs available and affordable to farmers which depend on their varying capacities.

Table 4.13: Yearly Changes in Livestock by ANOVA

Type		Sum of Squares	df	Mean Square	F	Sig.
Catfish	Between Groups	344741.581	4	86185.395	.104	.981
	Within Groups	82142033.179	99	829717.507		
	Total	82486774.760	103			
Cattle	Between Groups	7803.782	4	1950.945	1.755	.150
	Within Groups	64467.933	58	1111.516		
	Total	72271.714	62			
Goat	Between Groups	21774.568	4	5443.642	13.807	.000
	Within Groups	35484.316	90	394.270		
	Total	57258.884	94			
Poultry	Between Groups	24165.150	4	6041.287	7.927	.000
	Within Groups	88409.660	116	762.152		
	Total	112574.810	120			
Sheep	Between Groups	4689.749	4	1172.437	2.035	.110
	Within Groups	21321.870	37	576.267		
	Total	26011.619	41			
Pig	Between Groups	18071.147	4	4517.787	7.137	.000
	Within Groups	44308.800	70	632.983		
	Total	62379.947	74			

Source: Field Survey, 2015

A one-way ANOVA was performed to examine whether there were statistical significant differences in the production level of livestock across the sampled years in the study area. The test results indicated statistical significant differences across the years for goat $F(4, 90) = 13.807$, $p = .000$; poultry $F(4, 116) = 7.927$, $p = .000$ and pig $F(4, 70) = 7.137$, $p = .000$ while it was not significantly different in catfish $F(4, 99) = .104$, $p = .981$; cattle $F(4, 58) = 1.755$, $p = .150$ and sheep $F(4, 37) = 2.035$, $p = .110$. The observed significant differences across the selected years indicate the changes in animal production in the study area. This could be attributed to various reasons although the manager of green farm in Bonu during the FGD stated thus;

The major problems affecting livestock production are disease, insecurity of farm and farm products especially theft among farm workers and unnecessary tax. (A 46 years old, Alhaji, Manager Green Farm, Bonu ward).

4.6 Farmers Perception on Changes in Level of Agricultural Productivity

The perception of farmers on changes in agricultural production was considered and the nature, causes of the changes as well as the possible ways of tackling the changes was examined. Details of the empirical results are as presented in table 4.14.

Table 4.14: Nature of Changes by Farmers

Variable	SA		A		DA		SD	
	Freq	%	Freq	%	Freq	%	Freq	%
Temperature increase	45	11.8	263	68.8	52	13.6	22	5.8
Rainfall decreased	37	9.7	190	49.7	109	28.5	46	12
Increasing rainfall	45	11.8	257	67.3	55	14.4	25	6.5
Increase in drought occurrences	17	4.5	100	26.2	204	53.4	61	16
Decrease in crop production	42	11	156	40.8	143	37.4	41	10.7
Decrease in animal production	68	17.8	219	57.3	74	19.4	21	5.5
Increase in agricultural produce	55	14.4	205	53.7	92	24.1	30	7.9
Increased demand for agricultural produce	135	35.3	224	58.6	16	4.2	7	1.8

Source: Field Survey, 2015

Table 4.14 revealed that 68.8% of the respondents agreed that temperature increased over the last 30 years while 49.7% opined that, rainfall decreased over the last 30 years. This is a clear negative change as it resulted in low crop yield. But 67.3% opined that rainfall is likely to increase over lifetime. This is in line with the findings of Yusuf and Atteh (2009) which revealed that over a period of 30years in Zaria which is in same region with the study area, rainfall shows a decrease while temperature increases. It also supports the findings of Bello *et al.*, (2012) who revealed that temperatures in Nigeria increased from 1901-2005 and especially from the seventies while rainfall decreased. Also about

53.4% disagreed that drought occurrences was increasing, this therefore contradicts the complain of a discussant during the FGD who stated that;

Farmers in Lefu ward are facing problems of climate change especially long period of drought that caused decay of yam seeds which were planted earlier i.e. 4-5 months, resulting in reduction in quality and quantity of yam production (A 55 years old Mallam, Lefu ward).

Another 40.8% agreed to decrease in crop production over the years, 57.3% also agreed to decrease in animal production over the years, these are negative changes experienced over the years in the study area. Table 4.14 further showed that close to 54% of the respondents agreed to general increase in agricultural produce over the years while 58.6% also agreed to general increase in the demand for agricultural produce over the years. The increase in demand could be a function of increase in population in the study area as even NPC (2006) pointed that there has been an increase in population growth all over Nigeria over the years.

Table 4.15: Causes of Changes in Agricultural Production

Causes	SA		A		DA		SD	
	Freq	%	Freq	%	Freq	%	Freq	%
Climate changes over the years	31	8.1	183	47.9	116	30.4	52	13.6
Destruction of nature	99	25.9	248	64.9	22	5.8	13	3.4
Inadequate farm inputs	55	14.4	185	48.4	90	23.6	52	13.6
Inadequate extension workers	115	30.1	215	56.3	40	10.5	12	3.1
Inadequate labour	40	10.5	125	32.7	171	44.8	46	12
Lack of market for agricultural produce	49	12.8	105	27.5	187	49	41	10.7

Source: Field Survey, 2015

Table 4.15 revealed that 47.9% of the respondents agreed that the cause of change in agricultural production was largely due to climate change over the years while 30.4% of the respondents disagreed to that cause. This is supported by the statement of a discussant during FGD that,

The major problems of agricultural production in the area are; insufficient rainfall, pest and diseases, destruction of crops by Fulani cattle and infertility of land resulted to poor yield production over time. (A 55 years old Mallam, Bonu ward 2015).

This also supports the opinion of Yusuf (1999) that climate change can cause significant change in agricultural production anywhere in Nigeria. About 64.9% respondents largely attributed the change to destruction of nature. This is in support of the findings of Majid (2004) who pointed out that human activity such as deforestation affect natural ecosystem which in turn can affect agricultural activities via climate changes. About 48.4% claimed inadequate farm inputs but 23.6% disagreed to this reason. Inadequate farm inputs can actually temper with agricultural production as it is on the basis of inputs is equivalent to out (production) as posited by Adamu (2001). For about 90% the reason was inadequate extension workers and 44.8% disagreed to the claim that the cause was inadequate labour even though about 32.7% agreed. Finally, majority 49.0% of the respondents disagreed that the cause was lack of market for agricultural produce although three-quarter agreed to lack of market as a cause. In general, this implies that several reasons are attached to the observed changes in agricultural production in the study area.

Table 4.16: Ways of Improving Agricultural Production

Ways of improving agricultural production	SA		A		DA		SD	
	Freq	%	Freq	%	Freq	%	Freq	%
Education on modern technique and climate change	169	44.2	172	45	28	7.3	13	3.4
Proper execution of agricultural policies	102	26.7	220	57.6	47	12.3	13	3.4
Availability and affordability of farm inputs	201	52.6	151	39.5	20	5.2	10	2.6
Infrastructural development to encourage young farmers	222	58.1	143	37.4	12	3.1	5	1.3
Access to loans and grants for agriculture	109	28.5	208	54.5	46	12	19	5
Good market for sales of farm produce	146	38.2	217	56.8	16	4.2	3	0.8

Source: Field Survey, 2015

Table 4.16 revealed that 89.2% of the respondents suggested that farmers should be educated to enable them understand modern farming techniques and climate change as a way of improving agricultural production. About 84.3% suggested that government should ensure proper execution of agricultural policies, which was also pointed by Nwachukwu *et al.*, (2008), for 92.1% there should be available and affordable farm inputs like fertilizer, chemicals and tractors for farmers as also suggested by Adesina (2014). This is also buttressed by a statement of one of the inhabitants of Bonu village during discussion who maintained that;

The negative changes in crop production over 20 years can be improved through provision of adequate infrastructure, affordable farm inputs like, fertilizer, pesticide, tractors, implements and effective extension officers (A 45 years old Mallam, Bonu ward).

Another discussant also stated that;

To motivate farmers, government should ensure provision of farm inputs to farmers through alternative way of collection of farm produce instead of cash money to improve agricultural produce market and storage system
(A 60 years old Mr, Diko ward).

Table 4.15 further revealed that 58.1% of the respondents suggested rural infrastructural development to encourage young farmers; this is better understood by the opinion of a discussant during discussion in Izom that;

The major challenge of farmers in Izom ward is the youth migration to urban centres such as Suleja, federal Capital Territory for white colour jobs due to inadequate infrastructures in Izom thereby leaving behind the

old-age men and women on farm work (A 65 years old Mallam Hassan Musa, Izom ward).

About 54.5% suggested access to loans and grants for agriculture while 56.8% suggested that there should be good market for sales of farm produce in the study area. These suggestions are similar to that of FAO (2008), UNDP Nigeria (2010) who suggested rural infrastructural development should be increased to encourage youth to venture into farming in the rural areas, while loans for rural farmers, exporting of rural farm produce as well as good storage facilities should be provided to improve rural farmers in Nigeria.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of major findings of the study, the conclusions drawn from the findings. The chapter also presents recommendations made which were derived from the findings of the research.

5.1 Summary of Findings

This study aimed at assessing the changes of agricultural production in Gurara local government area of Niger state. The two divisions of the local government area were considered from where sampled wards were selected.

The study revealed that most farmers in the area were male which are married and falls within the youthful age cadre which means the area has a population with potentials for agricultural activities. The study found that most of the respondents were farmers by occupation although that was the target population but it was shown that majority of them have attended one form of formal education or the other and mostly run family farms.

The study also found that yam is cultivated more than other crops; there are changes in number of catfish harvested, cattle, goat, poultry, sheep and pig. Although hired labour was found to be mostly used by farmers, in terms of animal production, poultry production was found to be the most common among the people of the area.

The study found that 76.6% of respondents observed a decrease both in quality and quantity of produce. For 42.9% of those that observed changes attached the change to accessibility of land, 22.8% attributed it to climate while 35.2% reasons for the change were adequate extension workers and inputs and reduced disease and pest.

The study revealed a statistically significant difference for rice, groundnut and yam while there was no significant difference in maize yield between the LGA Divisions. It also

found that there exist statistically significant differences across the years for maize, sorghum, groundnut and yam while in rice it was not significantly different.

Furthermore, the study found a significant difference for catfish, cattle, poultry and sheep while there was no significant difference for goat between the LGA Divisions. It finally found statistically significant differences across the years for goat, poultry and pig while it was not significantly different in catfish, cattle and sheep.

The study revealed that majority of the respondents agreed that temperature increased over the last 30 years (68.8%), while rainfall decreased over the last 30 years (49.7%). Another 40.8% agreed to decrease in crop production over the years, 57.3% also agreed to decrease in animal production over the years. The study also revealed that majority of the respondents attributed the cause of change in agricultural production to be climate change over the years (47.9%) while 30.4% of the respondents disagree to that cause. The study revealed that majority (89.2%) of the respondents suggested that farmers should be educated to understand modern technique and climate change as a way of improving agricultural production while 84.3% suggested that government should ensure proper execution of agricultural policies.

5.2 Conclusion

The study concludes that, accessibility of land, access to herbicides/insecticide and pesticides, fertilizer, improved seed/varieties and extension services, access to micro finance and veterinary services as well climate are vital to agricultural production. The study revealed that, the main driving force for the decrease in agricultural production in the study area was insufficient land for agriculture, poor access to herbicides/insecticide and pesticides, fertilizer, improved seed/varieties and extension services, loan and veterinary services and above all change in climate. The effectiveness of the various agricultural inputs which aimed at improving production is being undermined by various factors such

as shortage of rainfall and increase in temperature. These therefore with other lagging areas resulted to decrease both in quantity and quality of agricultural production in the study area. The study therefore concludes that there is a decrease in crop and animal production in the study area over time (over the years).

5.3 Recommendations

The following recommendations were proffered based on the findings of the study.

- ❖ The female gender should be encouraged by government to engage in farming activities by organizing workshops, seminars on agriculture but strictly for women in the study area. This will go a long way in increasing agricultural production by increasing the number of farmers in the study area.
- ❖ Policies should be formulated by government to discourage a land tenure system that limits farmer's accessibility to agricultural farm lands as observed in Diko ward of the study area.
- ❖ Farmers should form progressive unions and co-operatives societies through which government ensures access to farm inputs with ease and at affordable cost in the study area.
- ❖ Schemes for agricultural loan should be improved upon by government in the area by increment in the amount and at beginning of cultivation period.
- ❖ Government and other stakeholders concerned with agriculture should concentrate on reducing the agricultural implications of climate change in the area and find a way of adapting to the impact on agricultural production through mass education, awareness of causes of climate change in the study area. In this direction, NiMET should ensure that farmers have access to meteorological forecast translated and interpreted in their various local languages for effective implementation. Also,

improved breeds and seeds should be provided to farmers through their village heads and extension services workers.

REFERENCES

- Abaye, C. and Giwa, S. (2007). Urban Flooding and Environmental Safety. *Journal of Ecology and Natural Science* 5(7):70-72.
- Abayomi, F. (2006). An Overview of Nigerian Agricultural Sectors. *Journal of Agricultural Economic*, 8(3):7-16.
- Adamu, G. (2001). *Focus on Gurara Local Government*: Abuja. Solytec Press Ltd.
- Adebayo, K. and Okuneye, P.A. (2005). Economics of Agricultural Extension. In Adedoyin, S.F. (ed). 251.
- Adedeji, A. Sheu, S. and Dietrich, V. (2013). Nigeria Strategy Support Program II: Structural Change in the Economy of Nigeria, *International Food Policy Research Institute*. Working paper No. 24, July 2013.
- Adefila, J.O. (2011). Spatial Assessment of Farmers' Cooperative Organizations in Agricultural Development in Gurara Area of Niger State, Nigeria: *Journal of Ecology and the National Environment*. 4(2):51-57.
- Adesina, A. (2014). Research to Feed Africa. Paper Presented at the High Policy Dialogue. Vanguard News Saturday September 13, 2014. Article Agricultural Terms Formation: Africa urged to Talk Collectively.
- Agbola, T. and Ojeleye, D. (2007). Climate Change and Food Crop Production in Ibadan, Nigeria. *African Crop Science Conference Proceeding* 8:1423-1433
- Alvaro, C. Tingju, Z; Katrin, R; Richard S.J; and Claudia, R. (2009). Economy-Wide Impact of Climate change on Agriculture in Sub-Saharan Africa. *International Food Policy research Institute (IFPRI)* Discussion Paper. No. 00873:1.
- Ammani, A.A., Ja'afaru, A.K., Aliyu, J.A. and Arab, A.I. (2012). Climate Change and Maize Production: Empirical Evidence from Kaduna State, Nigeria. *Journal of Agricultural Extension* 16(1):1-19
- Are, L.A, Igbokwe, E.M, Asadu ,C.L.A and Bawa, G.S.(2010). *Comprehensive Certificate Agricultural Science: for Senior Secondary Schools*. University Press PLC, 10-15.
- Audu, E.B. (2012). Descriptive Analysis of Rainfall for Agricultural Planning in Lokoja Local Government Area of Kogi State, Nigeria. *International Journal of Science and Technology* 2(12):40-45
- Babasanya, B. Bolagun, O. Zungun, A. and Olowolunwa, J. (2008). Rural Development. An Approach to Poverty Aleviation in Nigeria *International Journal of Economics and Development*, 28-41.
- Braun, V. (2004). Towards a Renewable Focus on Rural Development, *Journal of Agriculture and Rural Development*, 11(3):4-6

- Cleveland, C.J. (2007). Agricultural and Research Economics Sustainable Development. United Commerce in Kurawa I. A. (eds). *A Publication of Kano State Government*.
- Daniel, S.U. and Kanu, I.O (2012). Effects of Agricultural Reforms on the Agricultural Sector in Nigeria. *Journal of African Studies and Development*. 4(2):51-59.
- DFID, UK Department of International Development (2004). Rural and Urban Development: A Case Study of Nigeria. *Oxford Policy Management*.
- Emmanuel, O.O. (2004). Strategies for Self-Reliant Economic Development of Urhoboland. *A Paper Presented at the 5th Annual Conference of Urhobo Historical Society* at PTI Conference Centre. Effurun, Delta State, Nigeria October 30, 2004.
- Enrique, R. C. (2004). The 1980s; The Debt Crisis and the Lost Decade. *Centre for International Finance and Development*. The University of Iowa, USA
- Fade-Aluko, T.O (2007). *Marketing Ofada Rice in Abeokuta Metropolis of Ogun State*. Department of Agricultural Economics and Farm Management, University of Agriculture, Abeokuta.
- Fakayode, B. Omotosho, O. Tsoho, A. and Ajayi, P. (2008). Economic Survey of Rural Infrastructure and Agricultural Productivity Profiles in Nigeria. *European Journal of Social Science* 7(2):158-160.
- FAO (2005). Rural Infrastructures and Agricultural Development Anti-hunger Programme: A Twin-Tack Approach to Hunger Reduction: *Priorities for National and International Action*, Rome.
- FAO (2008) Human Energy Requirement Report of a Joined FAO WHO/UN Expert Consultation. *FAO Food and Nutrition Technical Report Series 1*.
- Frederick, O.A., Dada, B.A., Garba, M. J. and Adanne, I. (2006). Macmillan Nigeria Secondary Atlas: *Macmillan Publishers Limited*, Lagos, 24-27.
- Gana, A .S., Maji, A.T., Ukwungu, M. N., Imolehin, E.D. and Ogunremi, L. (2000). Rice Varietal Development for Rain Fed Low Land Ecology of Nigeria, Change and Opportunities. *Paper Presented at the First ROCARIZ Meeting Held in Mbe, Coted 'Ivoire*.
- Gbadegesin, A.S. (1993). Agricultural Geography: Department of Geography University of Ibadan. *External Studies Program Series*, Ibadan University Press.
- Gollin, D. and Rogerson, R. (2002). The Role of Agriculture in Development; *American Economic Review* 92(2):160-170.
- Gurara Local Government Council, (2001). Gurara Local Government Area
- Heimlich, R.E. and Anderson, W.D. (2001). Development at the Urban Fringe and Beyond: *Inspects on Agriculture and Rural Land*. 803 Economic Research Services, US. Department of Agriculture, Washington D.C, 80.
- Hodder, R. (2000). *Development Geography*. Routledge. London.

- Ifeanyi-Obi, C.C. and Nnadi, F.N. (2014). Climate Change Adaptation Measures used by Farmers in South-South Nigeria. *Journal of Environmental Science, Toxicology and Food Technology* 8(4):1-6
- Ingawa. S.A. (2004). The Role of Data in Food Security in Nigeria. *Paper Presented at the 1st National workshop on Satellite Remote Sensing (Nigeria Sat 1) and G15; A Solution to Sustainable National Development Challenges: Which held at Abuja, Le Meridia Hotel.*
- Innocent, K. (2013). Brief History of Gurara Local Government. *African Heritage Gurara LG limited Edition*, 2013, 3-4.
- Intergovernmental Panel on Climate Change. (IPCC, 2007) *Revised Edition*, 1:20–23.
- Ismaila, U. Gana, N.M. Tswana, A. and Dogara, D. (2010). Cereals Production in Nigeria: Problems, Constraints and Opportunities for Betterment. *African Journal of Agriculture Research*, 5(12) 1342-1350.
- Jokisch, B. and Pribilsky, J. (202). The Panic to Leave Economic Crises and the New Emigration from Ecuador. *International Migration Review* 40(4):75-101.
- Kandlinkar, M. and Risbey, J. (2000). Agricultural Impacts of Climate Change, if Adaptation is the Answer. What is the Question? *Climate Change*, 45:529-539.
- Kaya, S. and Curran, P.J. (2005). Monitoring Urban Growth of European Side of the Istanbul Metropolitan Area. *International Journal of Applied Earth*, 18-25.
- Kolawale, O. Ojo, S.O. (2007). Economic Efficiency of Small Scale Food Crop Production in Nigeria. *Journal for Social Science* 14(2):123-130 National Cereals Research Institute Badaggy (NCRI) 2008, Metrological Station Report.
- Krejcie, R.V. and Morgan, D.W. (1970). Determining Sampling Size for Research Activities. *Educational and Psychological Measurement*, 30:600-610.
- Majid, N. (2004). Reading Millennium Goals, How Well does Agriculture Productivity Growth Reduce Poverty? *ILO Employment Strategy Paper*. 12:120-130.
- Malachey, A. (2014). How Nigeria can make Agriculture Blossom. *This Day News Paper*, Article. Saturday 7th June, 2014.
- Mendola, M. (2008). Migration and Technological Change in Rural Household Complement or Substitutes? *Journal of Development Economics* 85(1):150-175.
- Moncumill, D.F. (2006). Climate Variability and Corn Yields in Semiarid Ceara, Brazil. *Journal of Applied Meteorology and Climatology*, 46:226-280.
- Muhammad, M.A.S. (2007). Rural Development and Enterprises Development, *Alexandria, Sustainable Development Association.*
- National Population Commission (NPC) (2006). Federal Republic of Nigeria Official Gazette. 24: 94 (2007).

- Nchechuwe, F.F. and Adejuwon, K.D. (2012). The Challenges of Agriculture and Rural Development in Africa: *International Journal of Academic Research in Progressive Education and Development* 1(3):47-59.
- NEEDS, (2004). National Economic Empowerment and Development Strategy National Planning Commission, CBN, Abuja.
- Niger State Department of Budget and Planning National Population Commission, 2010.
- Niger State Ministry of Agriculture and Rural Development (2011). Niger State Ministry of Agriculture and Rural Development
- Niger State Ministry of Livestock and Fisheries (2014). Niger State Ministry of Livestock and Fisheries
- Niger State Bureau of Statistics (2013). Niger State Bureau of Statistics
- Nigerian National Planning Commission (2004). Meeting Everyone Needs. *National Economic Empowerment and Development strategy*. Nigeria National Planning Commission, Abuja.
- Nwachukwu, C., Ifeanyi, N., Nnanna, M., Ezech, C.I. and Kamalu, C. (2008). Evaluation of the 2nd NFDLP in Nigeria: A Rapid Policy Appraisal. *Fadama* www.fadama.net
- Oji-Okoro, I. (2011) Analysis of the Contribution of Agricultural Sector on the Nigerian Economic Development. *World Review of Business Research*. 1:191-200.
- Ojo, M.A., Mohammed, U.S., Olaleye, R.S and Ojo, A.O. (2009). Return to Scale and Determinates of Farm Level Technical Inefficiency Among Small Scale Yam Based Farmers in Niger State, Nigeria: Implication for Food Security. *International Journal of Agricultural Economics and Rural Development*. 2(1):49-50.
- Olukosi, J.O. Isitor, S.U. and Ode, O. (2007). *Agricultural Marketing and Prices; Principles and Applications*. 3rd edition. Living Books Series G.U. Publications, Abuja, 6-7.
- Peacock, C. (2004). Small Holder Agriculture; *Africa Pathway Out of Poverty*.
- Phillips, D. and Adetimirin, V.O. (2001). Enhancing the Transfer and Commercialization of Agricultural Technologies in Nigeria, *Pra Survey Report On The South West Zone Of Nigeria*, Prepared for OAU/SAFGRAD-STRC.
- Phillips, D., Emphrian, N., John, P. and Omobowale, A.O. (2009). Constraints to Increasing Agricultural Productivity in Nigeria: A Reviewed. Nigeria Strategy Support Program, *Background Paper NSSP 006. IFPRI*
- Recardo, C. (2004). Competing Theories of Economic Development. *Centre for International Finance and Development*. The University of IOWA, USA.
- Sandra, B. (2004). The 1960s and 1970s: The World Bank Attacks Poverty; Development Countries Attack the IMF. *Centre for International Fiancé and Development*, the University of IOWA USA.

- Shiru, J.J. (2008). Agricultural Mechanization for Rural Development Bida, *Journal of Management and Technology*, 1(1):12-14
- State Bureau of Statistics, Niger State Planning Commission (2011). State Bureau of Statistics
- Stock, P. (2005). Nigeria, Microsoft Encarta 2006, Redmond R.A. Microsoft Corporation.
- Sule, I. (2011). *An Assessment of the Vulnerability and Adaptation of Subsistence Farmers to Climatic Change and Variability in Niger State, Nigeria*. An Unpublished M.Tech. Thesis Geography Department Federal University of Technology, Minna
- Tali, J.A. and Murthy, K. (2012). Impact of Demographic and Aerial Changes on Urban Growth: A case study of Mysore city, *International Journal on Technical and Physical Problems of Engineering* 4(1):74-79.
- Ten Years of Gurara Local Government (2001). *Alpine Ventures*, Minna.
- Todaro, M.P. (2000). Economic Development, 7th Edition Addison Wesley Longman Inc.
- Todaro, M.P. and Smith, S.C. (2006). Economic Development, 8th Edition. Delhi. Derling Kindersley Ltd, 389.
- Udofia, E.E. (2014). Principle of Fish Farming: A Trade. Revised Edition for Senior Secondary Schools. Abai Production Limited. Abuja, 93-98.
- Ujo, A. (2005). *Theory and Practice of Development Administration: Abuja*. Adema Publishers.
- Ukeje, E.U. (2005). Modernizing Small Holder Agriculture to Ensure Food Security and Gender Empowerment; Issues and Policy, Retrieved from [hHp:IIwww.g24.org/ukeje.pdf](http://www.g24.org/ukeje.pdf)
- UNDP (2006). United National Development Programme: *Annual Report*.
- World Bank. (2007). Nigeria: Competitiveness and Growth Country Economic Memorandum.
Report No. 36483-NG.
- Wouterse, F. and Taylor, J. (2008). Migration and Income Diversification Evidence from Burkina Faso. *World Development* 36(4):625-640

APPENDIX I
DEPARTMENT OF GEOGRAPHY,
AHMADU BELLO UNIVERSITY ZARIA,
KADUNA STATE, NIGERIA

**Questionnaire on assessment of changes in agricultural production in Gurara Local
Government Area of Niger State**

Dear respondent, I am an M.Sc. student of the above named University undertaking a research on the assessment on changes in agricultural production in Gurara Local Government Area of Niger State. Please help fill this questionnaire and be assured that all information provided will be treated in strict confidence and used only for academic purpose.

**SECTION A: SOCIO-ECONOMIC AND DEMOGRAPHIC CHARACTERISTICS
OF THE RESPONDENTS.**

INSTRUCTION: Tick [✓] appropriately as it applies to you.

1. Name of ward.....
2. Gender: Male [] Female []
3. age: (a) 0-15 years [] (b) 16-30 years [] (c) 31 -45 [] (d) 46-60 [] (e) 61-75 [] (f) 76 years above []
4. Marital Status: (a) Single [] (b) Married [] (c) Divorced [] (d) Widowed []
5. Level of Education (a) Primary [] (b) Secondary [] (c) tertiary [] (d) Quranic [] (e) None [] (f) others (specify)
6. Occupation (a) Crop production [] (b) Livestock production [] (c) Trader [] (d) civil Servant []

SECTION B: ASSESS THE CHANGES IN CROP PRODUCTION

Please indicate the appropriate answer by ticking (✓) the correct option

7. Do you operate collective (family) farm holding and or individual plate (gayuna)?
(a) Family () (b) individual () (c) Both ()

8. How do you provide labour for your farms?

(a) Family labour only () (b) Hired labour only () (c) Family and hired labour () (d)

Others (Specify)

9. What crops do you grow on your farm? (a) Rice () (b) Maize () (c) Guinea corn ()

(d) Yam () (e) Ground-nut ()

10. Kindly provide information by completing the table below based on your harvest in the last five years.

YEARS	NO	CROP	YIELD 100KG/BAG/NO OF TUBERS
2008	1	Rice	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	2	Maize	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	3	Guinea Corn	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	4	Groundnut	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	5	Yam	(a) 100-500 () (b) 501-1000 () (c) 1001-2000 () (d) 2001-3000 () (e) 3001 and above ()
2009	1	Rice	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	2	Maize	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	3	Guinea Corn	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	4	Ground nut	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	5	Yam	a) 100-500 () (b) 501-1000 () (c) 1001-2000 () (d) 2001-3000 () (e) 3001 and above ()
2010	1	Rice	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	2	Maize	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	3	Guinea Corn	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	4	Ground nut	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	5	Yam	a) 100-500 () (b) 501-1000 () (c) 1001-2000 () (d) 2001-3000 () (e) 3001 and above ()
2011	1	Rice	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	2	Maize	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	3	Guinea Corn	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	4	Ground nut	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	5	Yam	(a) 100-500 () (b) 501-1000 () (c) 1001-2000 () (d) 2001-3000 () (e) 3001 and above ()
2012	1	Rice	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	2	Maize	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	3	Guinea Corn	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	4	Ground nut	(a) 1-5 () (b) 6-10 () (c) 11-15 () (d) 16-20 () (e) 21 and above ()
	5	Yam	(a) 100-500 () (b) 501-1000 () (c) 1001-2000 () (d) 2001-3000 () (e) 3001 and above ()

SECTION C ASSESS THE FACTORS INDUCING CHANGES IN CROP PRODUCTION

11. Have there been any significant changes in the following in which you operate? (a)

Yes () (b) No ()

12. What is the pattern of changes?

a. Increase quality ()

b. Decrease quality ()

c. Increase quantity ()

d. Decrease quantity ()

13. What is the pattern of changes?

a. Favourable climate ()

b. Inadequate Extension workers ()

c. Lack inputs ()

d. Adequate access of land ()

e. Reduced disease and pest ()

f. Others (specify).....

Do you have access to items in question 3 to 7 within 1-4kms?

14. Herbicides and pesticides? Yes () No ()

15. Fertilizer Supply? Yes () No ()

16. Improved Seeds supply? Yes () No ()

17. Extension Services? Yes () No ()

18. Micro finance? Yes () No ()

19. What is the distance (in Km) of your farm to the nearest market?

(a) 0- 5kms () (b) 6- 10kms () (c) 11- 15kms () (d) 16-20kms ()

SECTION D: QUESTIONNAIRE FOR LIVESTOCK/FISHES PRODUCTION

Please indicate the appropriate answer by ticking (✓) the correct option

Assess the Changes in Livestock/Fishery Production.

20. Do you operate collective (family) farm holding (ganda) and or individual plate (gayauna)? (a) Family () (b) Individual () (c) Both ()

21. How do you provide labour for your farms? (a) Family labour only () (b) Hired labour only () (c) family and hired labour () (d) others (specify)

22. What livestock do you rear in your farm? (a) Fish () (b) Cattle () (c) Goat () (d) Poultry () (e) Sheep () (f) Pig ()

23. Kindly provide information by completing the table below based on your harvest in the last five years.

YEARS	NO	ANIMALS	YIELD IN NUMBERS
2008	1	Catfish	(a) 100-1000 () (b) 1001-2000 () (c) 2001-3000 () (d) 3001 and above ()
	2	Cattle	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	3	Goat	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	4	Poultry	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	5	Sheep	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	6	Pig	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
2009	1	Catfish	(a) 100-1000 () (b) 1001-2000 () (c) 2001-3000 () (d) 3001 and above ()
	2	Cattle	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	3	Goat	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	4	Poultry	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	5	Sheep	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	6	Pig	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
2010	1	Catfish	(a) 100-1000 () (b) 1001-2000 () (c) 2001-3000 () (d) 3001 and above ()
	2	Cattle	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	3	Goat	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	4	Poultry	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	5	Sheep	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	6	Pig	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
2011	1	Catfish	(a) 100-1000 () (b) 1001-2000 () (c) 2001-3000 () (d) 3001 and above ()
	2	Cattle	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	3	Goat	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	4	Poultry	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	5	Sheep	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	6	Pig	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
2012	1	Catfish	(a) 100-1000 () (b) 1001-2000 () (c) 2001-3000 () (d) 3001 and above ()

			(b) and above ()
	2	Cattle	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	3	Goat	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	4	Poultry	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	5	Sheep	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()
	6	Pig	(a) 5-20 () (b) 21-50 () (c) 51-100 () (d) 101 and above ()

The factors inducing Changes in Livestock/fishery production

24. Do you observe and changes in your animal production?

(a) Yes () (b) No ()

25. If Yes, what responsible for the changes you observed above?

a. Favourable climate ()

b. Inadequate Extension services ()

c. adequate inputs ()

d. Adequate access to land ()

e. Reduced disease and pest ()

f. Others (specify).....

Do you have access to items in question 3 to 7 within 1-4kms?

26. Feeds? Yes () No ()

27. Insecticides and pesticides? Yes () No ()

28. Improved varieties? Yes () No ()

29. Veterinary Services? Yes () No ()

30. Micro finance? Yes () No ()

31. What is the distance (in Km) of your farm to the nearest market?

(b) 0- 5kms () (b) 6- 10 kms () (c) 11- 15kms () (d) 16-20kms ()

SECTION E

FARMERS PERCEPTION OF CHANGES IN AGRICULTURAL PRODUCTION

INSTRUCTION: Tick [✓] appropriately as it applies to you according to your level of agreement or disagreement: SA = Strongly Agree; A = Agree; D = disagree; SD= Strongly Disagree.

No	Statement	SA	A	D	SD
32.	The temperature has increase over the last 30 days				
33.	Rainfall has decreased over the last 30 years				
34.	Rainfall is likely to increase in over life time				
35.	Drought occurrences in increasing				
36.	There is decrease in crop production over the years				
37.	There is decrease in volume in animal production over the years				
38.	There is increase of agricultural produce over the year				
39.	There is increase in demand for agricultural produce over the year				
	Cause of changes in agricultural production				
40.	Climate changes over the year				
41.	Destruction of nature				
42.	Inadequate farm inputs				
43.	Inadequate extension officers				
44.	Inadequate labour.				
45.	Lack of market for agricultural products				
46.	In appropriate execution of government policies				
	Ways to improve agricultural production.				
47.	Farmers should be educated enough to understand modern technique of farming and enlighten on climate change.				
48.	Government should ensure proper execution of agricultural policies				
49.	Availability and affordable farm inputs like fertilizer chemical and tractors, seeds and hybrid seedlings				
50.	Infrastructural development in rural areas to encourage young farmers				
51.	Producers should have access to grant and loans for agricultural production.				
52.	There should be good market for sales of farm produce.				

THANK YOU.

Appendix II

FOCUS GROUP DISCUSSION GUIDE

TOPIC: ASSESSMENT OF CHANGES IN AGRICULTURAL PRODUCTION IN
GURARA LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

S/NO	GENERAL QUESTION	PROBE
1.	What do you think about the topic that we have gathered here to discuss on the assessment of changes in agricultural production among you people?	To find out whether the people know the causes of changes in agricultural production.
2.	What do you think are the major causes of changes in agricultural production in your area?	To find out the level of awareness on changes in agricultural production.
3.	What nature of changes do you experience and how long?	To find out either positive or negative changes in production.
4.	State any example of changes in your agricultural produce you experienced?	To find out practical examples.
5.	Are the changes in crop production and livestock and fisheries the same?	To compare crop production and animal production.
6.	What measure have you take to control these causes of changes in agricultural product?	To find out efforts and ways people respond to the changes in agricultural production.
7.	The efforts you made, do you achieve your objective?	To find the best responds to the changes in agricultural production.
8.	What are the efforts made by Government to reduce the negative changes in agricultural production?	To find out government efforts in improving agricultural production.
9.	Does the services of extension officers add value to your product?	To find out the service of agricultural extension officers.
10.	Who are the major suppliers of farm inputs?	To find out the level of mechanization farming in the study area.
11.	What is the solution to negative changes in agricultural production?	To find out positive suggestion for improvement in agricultural production.

APPENDIX III

Crop Yield/ Animal Production among Respondents

Distribution of Respondents by Rice Yield

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	100-500kg	-		-		-		2	8	5	20	7	5.6
	501-1000kg	4	16	3	12	3	12	3	12	4	16	17	13.6
	1001-1500kg	4	16	4	16	6	24	6	24	4	16	24	19.2
	1501-2000kg	12	48	14	56	12	48	11	44	9	36	58	46.4
	Above 2000kg	5	20	4	16	4	16	3	12	3	12	19	15.2
Gurara East	100-500kg	5	12.8	1	3.2	2	6.7	1	3.3	6	20	15	9.4
	501-1000kg	12	30.8	6	19.4	9	30	12	40	4	13.3	43	26.9
	1001-1500kg	9	23.1	15	48.4	12	40	7	23.3	8	26.7	51	31.9
	1501-2000kg	8	20.5	4	12.9	5	16.6	6	20	10	33.3	33	20.6
	Above 2000kg	5	12.8	5	16.1	2	6.7	4	13.3	2	6.7	18	11.3

Distribution of Respondents by Maize Yield

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	150-750kg	-		-		3	15	2	10.5	6	31.6	11	12.4
	751-1500kg	5	41.7	3	15.8	5	25	5	26.3	5	26.3	23	25.8
	1501-2250kg	2	16.7	7	36.8	5	25	7	36.8	6	31.6	27	30.3
	2251-3000kg	3	25	7	36.8	6	30	5	26.3	2	10.5	23	25.8
	Above 3000kg	2	16.7	2	10.6	1	5	-	-	-	-	5	5.6
Gurara East	150-750kg	3	2.5	4	3.4	9	7.6	14	12.2	31	26.7	61	10.4
	751-1500kg	13	10.8	18	15.4	24	20.3	35	30.4	38	32.8	128	21.8
	1501-2250kg	13	10.8	29	24.8	41	34.7	36	31.3	20	17.2	139	23.7
	2251-3000kg	44	36.7	48	41	33	30	21	18.3	21	18.1	167	28.5
	Above 3000kg	47	39.2	18	15.4	11	9.4	9	7.8	6	5.2	91	15.5

Distribution of Respondents by Sorghum Yield

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	160-800kg	2	8.7	6	26.1	5	21.7	7	29.2	10	41.7	30	25.6
	801-1600kg	4	17.4	2	8.7	7	30.4	7	29.2	6	25	26	22.2
	1601-2400kg	8	34.8	6	26.1	5	21.7	6	25	5	20.8	30	25.6
	2401-3200kg	6	26.1	6	26.1	5	21.7	4	16.7	3	12.5	24	20.5
	Above 3200kg	3	13	3	13	1	4.3	-	-	-	-	7	6
Gurara East	160-800kg	6	5.1	4	3.6	7	6.3	19	16.8	37	32.7	73	12.9
	801-1600kg	11	9.4	20	17.9	33	29.5	40	35.4	27	23.9	131	23.1
	1601-2400kg	21	17.9	30	26.8	30	26.8	22	19.5	20	17.7	123	21.7
	2401-3200kg	36	30.8	38	33.9	27	24.1	21	18.6	13	11.5	135	23.8
	Above 3200kg	43	36.8	20	17.9	15	13.4	11	9.7	16	14.2	105	18.5

Distribution of Respondents by Groundnut Yield

LGA Division	No of bags	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	80-400kg	-	-	-	-	-	-	3	50	4	66.7	7	23.3
	401-800kg	3	50	1	16.7	4	66.7	2	33.3	2	33.3	12	40
	801-1200kg	2	33.3	4	66.6	2	33.3	1	16.7	-	-	9	30
	1201-1600kg	1	16.7	1	16.7	-	-	-	-	-	-	2	6.7
	Above 1600kg	-	-	-	-	-	-	-	-	-	-	-	-
Gurara East	80-400kg	6	9.8	3	5.4	7	12.5	12	26.1	18	32.7	46	16.8
	401-800kg	7	11.5	11	19.6	17	30.4	16	34.8	11	20	62	22.6
	801-1200kg	18	29.5	23	41.1	19	33.9	5	10.9	14	25.5	79	28.8
	1201-1600kg	19	31.1	13	23.2	9	16.1	9	19.6	7	12.7	57	20.8
	Above 1600kg	11	18	6	10.7	4	7.1	4	8.7	5	9.1	30	10.9

Distribution of Respondents by Yam Yield

LGA Division	No of Tubers	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	100-500	9	15	7	10.9	11	19.3	7	15.6	14	27.5	48	17.3
	501-1000	12	20	12	18.8	16	28.1	16	35.6	12	23.5	68	24.5
	1001-2000	19	31.7	26	40.6	14	24.6	9	20	15	29.4	83	30
	2001-3000	12	20	11	17.2	10	17.5	8	17.8	7	13.7	48	17.3
	Above 3000	8	13.3	8	12.5	6	10.5	5	11.1	3	5.9	30	10.8
Gurara East	100-500	13	9.2	10	7.2	15	10.9	17	12.8	33	23.6	88	12.7
	501-1000	31	21.8	56	40.3	78	56.5	73	54.9	69	49.3	307	44.4
	1001-2000	78	54.9	62	44.6	34	24.6	27	20.3	22	15.7	223	32.2
	2001-3000	15	10.6	5	3.6	7	5.1	9	6.8	8	5.7	44	6.4
	Above 3000	5	3.5	6	4.3	4	2.9	7	5.3	8	5.7	30	4.3

Distribution of Respondents by Catfish harvested

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	100-1000	-		-		-		-		-		-	
	1001-2000	-		-		-		-		-		-	
	2001-3000	1	16.7	1	16.7	2	33.3	3	50	3	50	10	33.3
	Above 3000	5	83.3	5	83.3	4	66.7	3	50	3	50	20	66.7
Gurara East	100-1000	4	26.7	3	20	1	6.7	4	26.7	4	28.6	16	21.6
	1001-2000	2	13.3	6	40	8	53.3	3	20	2	14.3	21	28.4
	2001-3000	5	33.3	3	20	2	13.3	5	33.3	1	7.1	16	21.6
	Above 3000	4	26.7	3	20	4	26.7	3	20	7	50	21	28.4

Distribution of Respondents by Cattle

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	5-20	-	-	-	-	-	-	-	-	-	-	-	-
	21-50	-	-	-	-	-	-	2	50	3	75	5	25
	51-100	-	-	1	25	2	50	2	50	1	25	6	30
	Above 100	4	100	3	75	2	50	-	-	-	-	9	45
Gurara East	5-20	8	53.3	-	-	2	28.6	2	25	1	16.7	13	30.2
	21-50	1	6.7	2	28.6	2	28.6	4	50	2	33.3	11	25.6
	51-100	1	6.7	3	42.9	3	42.8	2	25	2	33.3	11	25.6
	Above 100	5	33.3	2	28.6	-	-	-	-	1	16.7	8	18.6

Distribution of Respondents by Goat

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	5-20	-	-	-	-	1	25	2	50	3	75	6	30
	21-50	2	50	2	50	1	25	2	50	1	25	8	40
	51-100	2	50	2	50	2	50	-	-	-	-	6	30
	Above 100	-	-	-	-	-	-	-	-	-	-	-	-
Gurara East	5-20	1	6.7	1	6.7	5	33.3	9	60	12	80	28	37.3
	21-50	4	26.7	10	66.7	9	60	5	33.3	2	13.3	30	40
	51-100	9	60	4	26.7	1	6.7	1	6.7	1	6.7	16	21.3
	Above 100	1	6.7	-	-	-	-	-	-	-	-	1	1.3

Distribution of Respondents by Poultry

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	5-20	-	-	-	-	-	-	2	33.3	2	33.3	4	13.3
	21-50	-	-	1	16.7	2	33.3	3	50	3	50	9	30
	51-100	3	50	3	50	3	50	1	16.7	1	16.7	11	36.7
	Above 100	3	50	2	33.3	1	16.7	-	-	-	-	6	20
Gurara East	5-20	4	21.1	4	22.2	4	22.2	6	33.3	10	55.6	28	30.8
	21-50	3	15.8	4	22.2	8	44.4	8	44.4	5	27.8	28	30.8
	51-100	7	36.8	9	50	6	33.3	3	16.7	3	16.7	28	30.8
	Above 100	5	26.3	1	5.6	-	-	1	5.6	-	-	7	7.6

Distribution of Respondents by Sheep

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	5-20	-	-	-	-	-	-	-	-	1	50	1	9.1
	21-50	-	-	-	-	1	50	2	100	1	50	4	36.4
	51-100	1	50	1	50	1	50	-	-	-	-	3	27.3
	Above 100	1	50	1	50	-	-	-	-	-	-	3	27.3
Gurara East	5-20	1	20	2	16.7	5	41.7	7	58.3	11	91.7	26	49.1
	21-50	2	40	5	41.7	5	41.7	4	33.3	1	8.3	17	32.1
	51-100	2	40	4	33.3	2	16.6	1	8.3	-	-	9	17
	Above 100	-	-	1	8.3	-	-	-	-	-	-	1	1.9

Distribution of Respondents by Pig

LGA Division	Quantity	2008		2009		2010		2011		2012		Total	
		N	%	N	%	N	%	N	%	N	%	N	%
Gurara West	5-20	-	-	-	-	-	-	-	-	-	-	-	-
	21-50	-	-	-	-	-	-	-	-	-	-	-	-
	51-100	-	-	-	-	-	-	-	-	-	-	-	-
	Above 100	-	-	-	-	-	-	-	-	-	-	-	-
Gurara East	5-20	2	13.3	4	26.7	6	40	8	53.3	12	80	32	42.7
	21-50	2	13.3	5	33.3	6	40	4	26.7	2	13.3	19	25.3
	51-100	9	60	5	33.3	3	20	3	20	1	6.7	21	28
	Above 100	2	13.3	1	6.7	-	-	-	-	-	-	3	4