# ADDIS ABABA UNIVERSITY
# SCHOOL OF GRADUATE STUDIES

***Livelihood Bases and Challenges of Small Farming House Hold: the case of Minjar- Shenkora Wereda Amhara Region, Ethiopia.***

**A Thesis Submitted to School of Graduate Studies of Addis Ababa University in Partial Fulfillment for the Requirements of the Degree of Master of Arts in Geography and Environmental Studies.**

**By Aweke Fekade Kebede**

**Research Advisor:**
**Yohannes G/michael (PhD)**

**July 2, 2015**
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**By**

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**Approved by Board of Examiners:** **Signature**

**Chairman:** _____ _____

**Advisor:** _____ _____

**Internal Examiner:** _____ _____

**External Examiner:** _____ _____

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*Aweke fekade*

# ACRONYMS

| | |
|---|---|
| **ADDP** | Ada District Development Project |
| **CADU** | Chilalo Agricultural Development Unit |
| **CIMMYT** | International Maize and Wheat Improvement Center |
| **DA** | Development Agents |
| **DAP** | Di-ammonium Phosphate |
| **EMA** | Ethiopian Mapping Agency |
| **FTC** | Farmers Training Centre |
| **HA** | Hectare |
| **KG/HA** | Kilogram per Hectare |
| **Lit/HA** | Litter per Hectare |
| **MMPI** | The First Minimum Package Program |
| **MPPII** | the Second Minimum Package Program |
| **MSDARDB** | Minjar-Shenkora District Agriculture and Rural Development Bureau |
| **NSZARDB** | North Showa Zone Agriculture and Rural Development Bureau |
| **PADEP** | Participatory Farmers Development Program |
| **PADETS** | Participatory Development and Extension Training System |
| **PAs** | Peasant Association |
| **QT/HA** | Quintal per Hectare |
| **TADU** | Tahtay Adiabo Development Unit |
| **WADU** | Wollaita Agricultural Development Unit |

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# DEFINITIONS OF KEY TERMS

**Challenge:** These are directly measured through the different kinds of problems that are related to marginalization of women, seasonal variations of different food crop price, lack of market information, lack of financial resources and access to credit services, problems of transportation, absence of modern input delivery agencies and research institutions.

**Extension**: Conscious use of communication of information to help people with sound advice and make good decisions.

**Households**: A group of persons who live together and make common provision for cooking food or other essentials of living.

**Kebele (PA):** The lowest administration unit in the country.

**Package**: A comprehensive approach dealing simultaneously with crucial facets of rural development such as agricultural extension, provision of inputs, credit and other requirements of agricultural production.

**Performance:** Refers to the different activities that are related to planning implementation, and evaluation processes of the current agricultura extension program.

**Productivity:** In this study, the productivity of farmers is measured through changes in average yield, total variable costs, gross benefits, and net benefits of the major food crops (Maize, Sorghum, and Millet) of the study area.

**Wereda:** Lower administrative unit above kebele.

# ABSTRACT

*The objective of this study is to see the livelihood bases of minjar- shenkora woreda at house hold level and to suggest solutions towards improving the level and conditions of resource management in the wereda.For this purpose two sample Kebeles have been chosen based on their land management system. The two sample Kebeles are: Cherecha Kebele and Dire Kebele. I have applied both primary and secondary data that has been collected through Structured interview with development agents, focus group discussion with some local farmers and field observation. The findings suggest that the households of Cherecha kebele have a better production system in the use of improved livestock feed, veterinary, and livestock breeding services from the small town. On the other hand, the households of Dire exhibit relatively low productivity in the use of fertilizer, pesticide, herbicides, selected seed, veterinary service, improved livestock feed etc. The research shows those modern agricultural inputs are/were introduced into the woreda coming from geographical areas which may or may not suitable for a particular area hence it needs more research on through involvement of the farm household in technology generation and dissemination in order to use the technologies sustainably . Generally, since most of the agricultural production comes from the small holders farm households and small farm households make up the largest segment of the rural population, promoting small farm households adoption of modern agricultural inputs in sustainable condition would bring the greatest overall benefits in terms increasing agricultural productivities in general and teff and wheat crops in particular.*

***Key Words: Resource management, farming systems, small farm unit, development agents,livelihood.***

# CHAPTER ONE

# 1. INTRODUCTION

## 1.1. Background

Agriculture remains the backbone of the economy in most African countries and is the key to both social and economic development (Breth, A. Steven., 1997). Nevertheless, despite the efforts and investments made by the governments and donor agencies in agricultural sector, household farm productivity has remained low and declined beyond the subsistence level.

Ethiopia is one of the least developed countries in the world and second more populous country in Sub Saharan African (SSA). For the country as a whole agriculture is the most important economic base and contributes 45 percent of the GDP and 90 percent of the foreign exchange earnings while as high as 95 percent of the rural economically active population is engaged in the agricultural sector (Befekadu Degefa and Berhanu Nega, 2000). Thus the development of the agricultural sector largely determines the pace of economic development.

At present, many scholars in Ethiopia are discussing the issue as to why agricultural sector remained backward and failed to generate surplus production; and most of them argue that one of the causes of stagnation in agricultural production is the low level of use of modern agricultural technologies (Awetahegne Alemayehu, 1975; Befekadu Degefa and Berhanu Nega, 2000). Therefore, the introduction of modern agricultural technologies (improved seeds, fertilizers, improved farm implements, improved animal husbandry, and land preparation and management methods) can increase the production and income of small farm households' in less developed country in general and Ethiopia in particular. As a result, modern agricultural technology plays a critical role in raising agricultural productivity and thereby contributing in improving the livelihoods of the small farm households in particular and the population as a whole. Over the past years various attempts have been made to raise agricultural productivity by extending new technologies to smallholder farmers through various extension and research outreach programs. Moreover, researchers like (Befekadu et al, 2000, Dejene, 1996; and Kebede, Undated) indicated that the introduction of modern agricultural technologies in Ethiopia has been done through the comprehensive package projects (such as CADU, WADU, TADU, MPP I and MPP II, PDEP). Although these programs have spatial biases and limited coverage, they ensured the increase in

major cereal crop productivity through improved technology adoptions and extension communication in that impact area. However, most of the programs failed to realize their initial objectives which emphasized to increase the real income of the rural farm households, generate additional employment opportunities, and produce surplus output as a means of capital formation (Befekadu et al, 2000; Dejene, 1996; Habtemariam, 1996 and Tesfai, 1975). All packages exercised since 1960's have not brought promising productivity as a whole due to multiple and inter related problems like inappropriate input and output policies, poorly designed research extension linkage, lack of access to credit by small farm households, and variability of rain fall and soil degradation also accounted for its low agricultural productivity. Hence, identification of these factors contributing to low adoption rate is needed to come up with possible options that would improve the level of agricultural technology adoption and, thereby, improving smallholder's agricultural productivity in particular and economic development in general.

## 1.2. Statement of the Problem

Africa is in the midst of generalized agricultural crisis, the most visible symptom of which is the continent's inability to feed itself. The crisis is mainly attributed to low level of agricultural technology innovation, diffusion and adoption of process. This, in turn, can be explained by inter woven nature of the problems.

Ethiopian agriculture is dominated by small farm households which produces 97 percent of the total agricultural output (CSA, 2003). However, the majority of them continue to depend on the traditional techniques of farming. As such, the performance of the agricultural sector in the country has been declining for decades. Major reasons attributed to the poor performance of Ethiopian agriculture emanate from inherent natural environment deficiencies, human induced problems and use of traditional techniques of farming (Arega, 2002; Befekadu et al, 2000). Hence, the sector needs the support of modern agricultural technologies to increase small farm households' agricultural productivity. In this regard, modern agricultural inputs like (chemical fertilizers Urea and DAP, improved variety of seeds and herbicides) are expected to play a dominant role. Thus, modern agricultural technologies are central and key components of agricultural development strategy in Ethiopia. However, as many of the literature indicated that Ethiopia has very poor and low level of modern agricultural technology innovation, dissemination and adoption even compared to African standards (Howard et al, 1995). This was because adoption behavior differs temporally and across socio-economic groups. Certain groups adopt some new technologies while others reject depending on the nature of the technologies and the socio-economic, agro-ecological and

institutional characteristics of a particular area, which naturally have important influence on small farm households' decision of adopting or rejecting new agricultural technologies.

Most of the literature on adoption of modern agricultural technologies dealt with particular locations. For instance, the CIMMYT and others study sites were generally in the main wheat and maize producing areas. In addition to this most of the CIMMYT studies in Eastern Africa and in Ethiopia focused on areas where adoption levels were known to be high this deliberate targeting was useful to show that some areas have in fact high level of adoption (Arega, 2002; Awetahegne, 1975; Doss, 2003; and Itana, 1985). Thus, most of the studies use the socio-economic and cultural variables as the major determinant variables in analyzing the factors that affects small farm household's decision to adopt to modern agricultural technologies. Such reports present detailed analysis on the socio-economic and cultural characteristics of farmers with attention to the use of improved technologies and the constraints farmers face. Therefore, many studies of agricultural technology adoption disregard the factors such as institutions and agro-ecological conditions of the area; which may cause difference in agricultural productivity at farm level. Moreover, very little is known about the types of agricultural technologies adopted by the farmers. Hence, the contention of the researcher is to analyze the institutional and agro-ecological variables that determine modern agricultural technologies adoption and crop productivity in the woreda. In addition, the researcher wants to see whether socio-economic variables that influence adoption of modern agricultural technologies are different or the same a given geographical areas. Obviously, this will provide further information for the planners and policy makers in order to formulate appropriate policy aimed at improving small farm household's agricultural productivity in general and crop productivity in particular in the study area.

## 1.3. Objective of the Study

To assess the livelihood of small holders farming and identify, the dynamics of productivity in the wereda.

## 1.4. The Specific Objectives

The specific objectives of the study:

- To document the livelihood bases of small holders farming and analyze the challenges of small holders farm.
- To evaluate the dynamics of demographic features and resource bases.

## 1.5. Research Questions

In order to attain the above stated objectives it is paramount importance to trace out the following questions:

- What are the major livelihood bases and challenges of small holders farm?
- What are the basic changes in demographic trends of resources bases?

## 1.6. Significance of the Study

The findings of this micro level study are helpful to have deeper knowledge about the determinants of adoption of modern agricultural inputs in Ethiopia in general and the study area in particular. In addition, identification of the agricultural technologies that are highly adopted or utilized by the households are vital in order to make effective agricultural extension and research on those technologies in the woreda. Therefore, the outcomes of the study can be `used in formulating future agricultural policies and strategies at local or woreda level. As well as it can be used as stimulus for further research to refine the conceptualization and methodology of the present study.

## 1.7. Scope of the Study

The scope of this research is to explore the major determinants of adopting modern agricultural technologies at woreda level. From this woreda two sample kebeles were surveyed for the purpose. Based on this sample the study identifies small farm households' determinant of modern agricultural technologies adoption and its contribution to improve crop productivities particularly teff and wheat. The determinants of small farm household's modern agricultural inputs adoption are multiple and inter related. These constitute the socio-economic and demographic, institutional and agro-ecological factors, although within these factors there are many variables, the following explanatory variables, i.e. availability of labor supply, farm size, availability of off-farm income, educational level of household head, age of household head, conditions of credit use, ratio of price of output and cost of input, conditions of land tenure, conditions of extension contact, distance to the market center, conditions of rainfall distribution, and conditions of soil fertility.

## 1.8. Limitation of the Study

to the analysis of only some selected socio-economic and demographic, institutional, and agro-ecological variables that affect household farming. In addition, the productivity of each agricultural inputs Given the time and financial resources, this research was subjected to certain limitations. This research was limited and combinations of one or more were based on the households use or application of these inputs during 2000 E.C. cropping season and the response of the household

heads during the survey; as a result the productivity of each agricultural technologies are not based on experiment by the researcher. Moreover, the research was limited to financial resources because of price escalation on goods and services which are vital for the research.

## 1.9. Organization of the Thesis

The thesis is organized into six chapters: the first chapter comprises introduction of the subject understudy, statement of the problem, objectives of the study, research questions, significance, scope and limitation of the study. The second chapter review of literature: includes definitions and measurements of modern agricultural technologies, adoption, productivity and concepts of small farm households. In addition, the third chapter includes the description of the study area and methodology. The fourth chapter presents the analysis and discussions of the findings of the study. Finally, chapters five summarizes the major research findings and give recommendations based on those findings.

## 1.10. Research designs

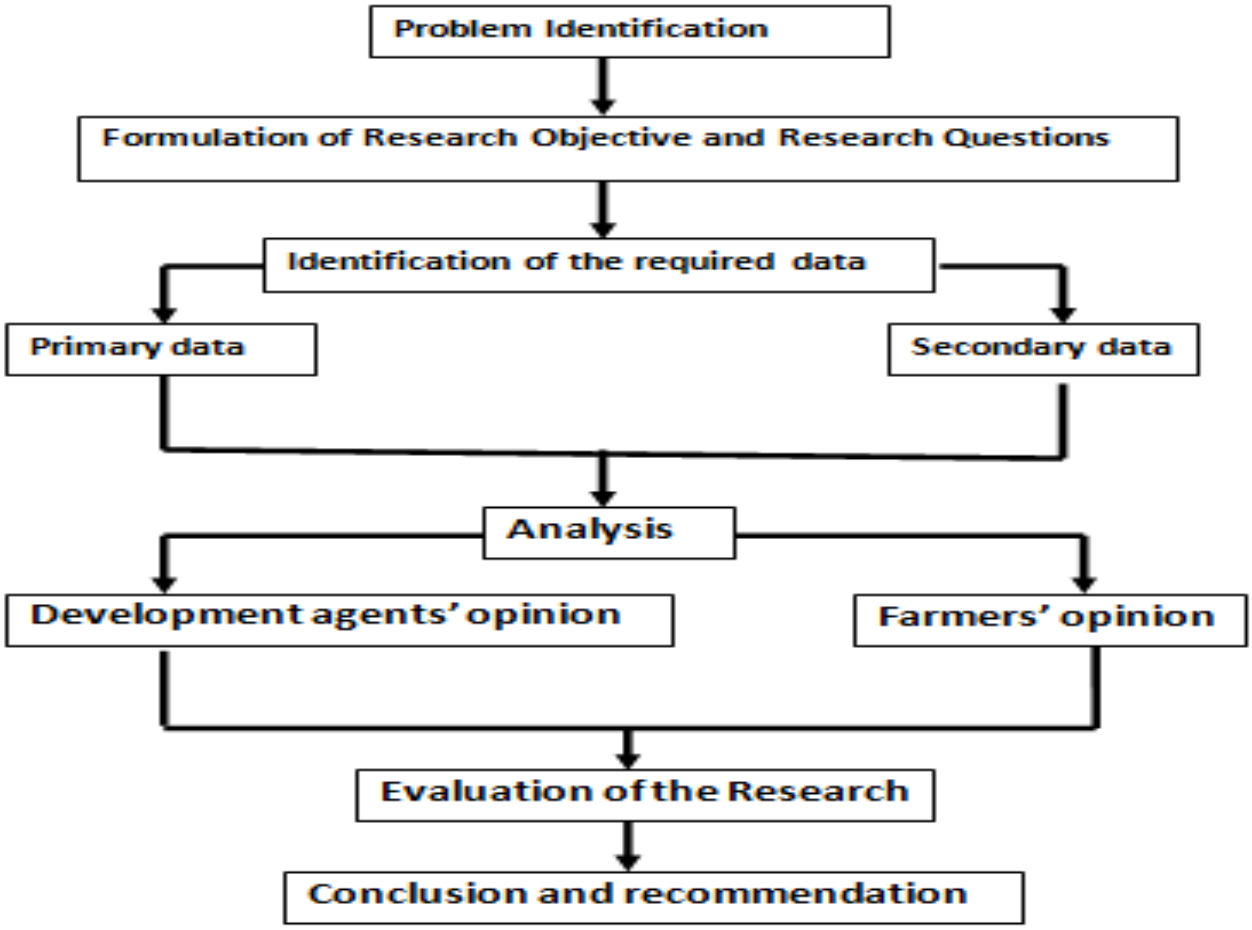


**Figure 1: A Diagram showing the research flow**

# CHAPTER TWO

# 2. PROFILE OF THE STUDY AREA

## 2.1. Bio-physical feature of the study area

### 2.1.1 Location and size

This study mainly focused and conducted in the Minjar Shenkora district, which is one of the 24 woredas located in the North Shewa Zone. The geographical location of the study area extended from $8^0$42'46" N to $9^0$7'37" N latitude and from $39^0$12'57" E to $39^0$46'53"E longitude (Figure: 2).

Minjar Shenkora district, locating farther to the southern part of North Shewa Zone, is bounded by Hagere Mareyam and Berehet woredas in the north direction and the remaining boundary of Minjar Shenkora is shared with parts of Oromia region in the west, south and east directions.

The study area is located towards the south direction of Debre Birehan-the administrative town of North Shewa Zone- with a distance of 260 km. Minjar Shenkora district is situated towards eastern direction of the capital city of Ethiopia, Addis Ababa having a distance of 130km between them.

Minjar Shenkora district is composed of a total of 29 *kebele*s, among them the 27 *kebele*s are part of rural area while the rest two *kebele*s are included in to the parts of urban areas; Dire and Cherecha are the two sample rural *kebele*s selected for the purpose of this study, the two *kebele*s are found in the distance of 145.5 km and 130 km far from Addis Ababa respectively.

Disregarding their area size Balchi and Ararti are the only two towns located in the Minjar Shenkora district. The so called Ararti town is administrative center of Minjar Shenkora district; being very small town the area size of Ararti is 1.9 square km or 191.39 hectares wide. The town is found at the heart of Ararti Zuriya rural *Kebele*.

Minjar Shenkora district holds the total area of 1,595.83 square kilo meters or 159,682.9 hectares of land, out of this total area the share of cultivated agricultural land is 34.98% or 55,860.38 hectare whereas the other 65.02 % of the area of Minjar Shenkora district is covered with non agricultural land use activities.

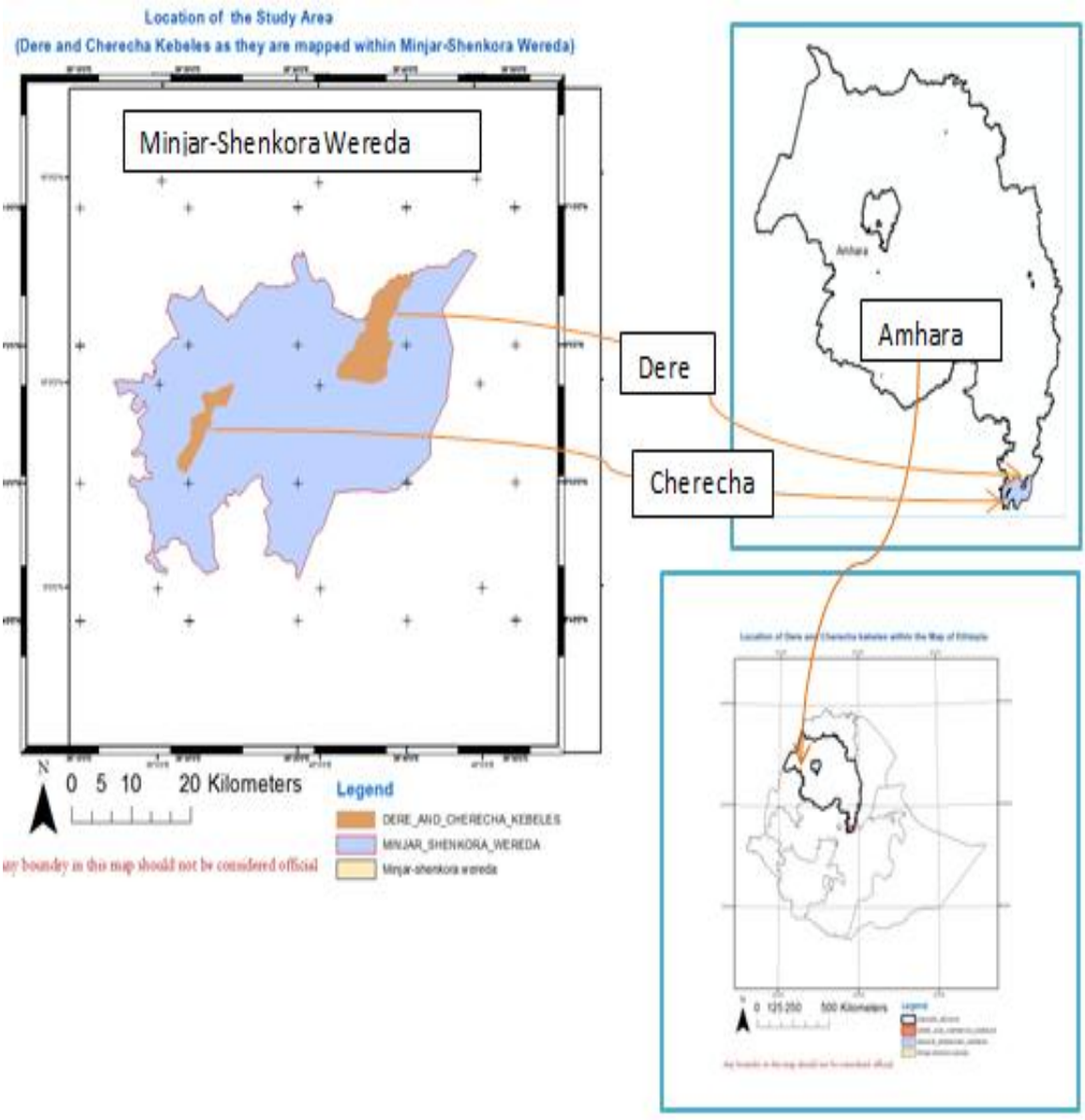


**Figure 2: Map of the Study Area**

Figure 3: An overview of Cherecha Kebele

**Source: (author)**

### 2.1.2. Relief and soil type

Even if there are various types of landscape in the Minjar Shenkora district, most of the study area are covered relatively plain areas, which constitute 84% of the total area of the locality. Due to its very low degree of steepness the area has a very great potential for the application of modern agricultural mechanization, it also minimize the problem of soil erosion and flood, where as it may be affected by water lodging. According 3l to MSDARDB information 14% of the study area is hilly and only 2% of the total area of Minjar Shenkora district is overlaid with mountains.

Based on the information from MSDARDB the vast area of the topography of Minjar Shenkora district lies on the average altitude of 1710 meters above sea level, because of this most of the relief located under the woinadega climatic condition. The altitudinal range of the study area ranges between the lowest point of 1040 meters asl to the highest point of 2380 meters asl. Due to this vast altitudinal range the study area accommodates three agro climatic regions Kola, Kola and Dega. Dere and Cherecha are the two randomly selected sample *kebele*s; Dere *kebele* ranges between 1640-1800 meters above sea level and the topography of Cherecha *kebele* range between1800-2000 meters above sea level.

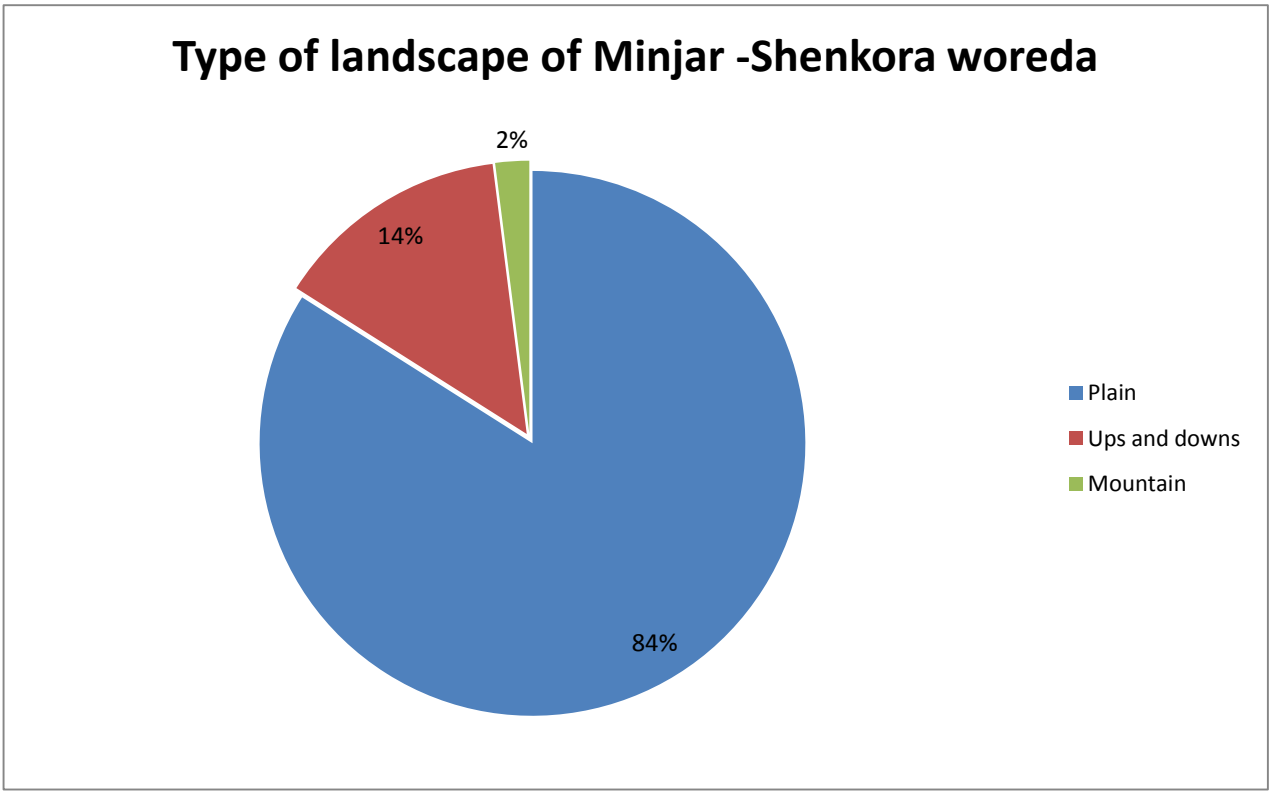


Figure 4: Landscape type of Minjar-Shenkora Wereda

**Source:** MSDARDB(2014)

According to MSDARDB Minjar Shenkora district has different soil types suitable to harvest various kinds of grains. The most dominant soil type in the study area is brown soil its coverage in the woreda (district) is about 46.5% of the total area. Even though their area coverage is very low there are also other types of soils, these are gray soil, black soil and red soil possessing the share of the total area 19.5%, 19% and 15% respectively.

### 2.1.3. Climate of the study area

Climate has a great effect in shaping the day to day social, economic and cultural activities of human beings. Consequently varies types of climate diversified the societal way of life. Since Ethiopia is a mountainous country the distribution of temperature and rainfall varies mainly depends on the altitudinal variation as a result there are five agro climatic zones in the country.

The topography of study area is found between the ranges of 1040 meter and 2380 meters above sea level. Consequently due to this range of altitude the study area is composed of three agro climatic regions- Kola, Woinadega and Dega. According to the MSEARDB (Table 2) report largest area of the Minjar Shenkora district is found under the woinadega agro climatic region accounting about 70.9 % of the total area. While the rest of the study area lies under kola and Dega climatic regions accounting 24.8 % and 4.3 % share of the total area respectively.

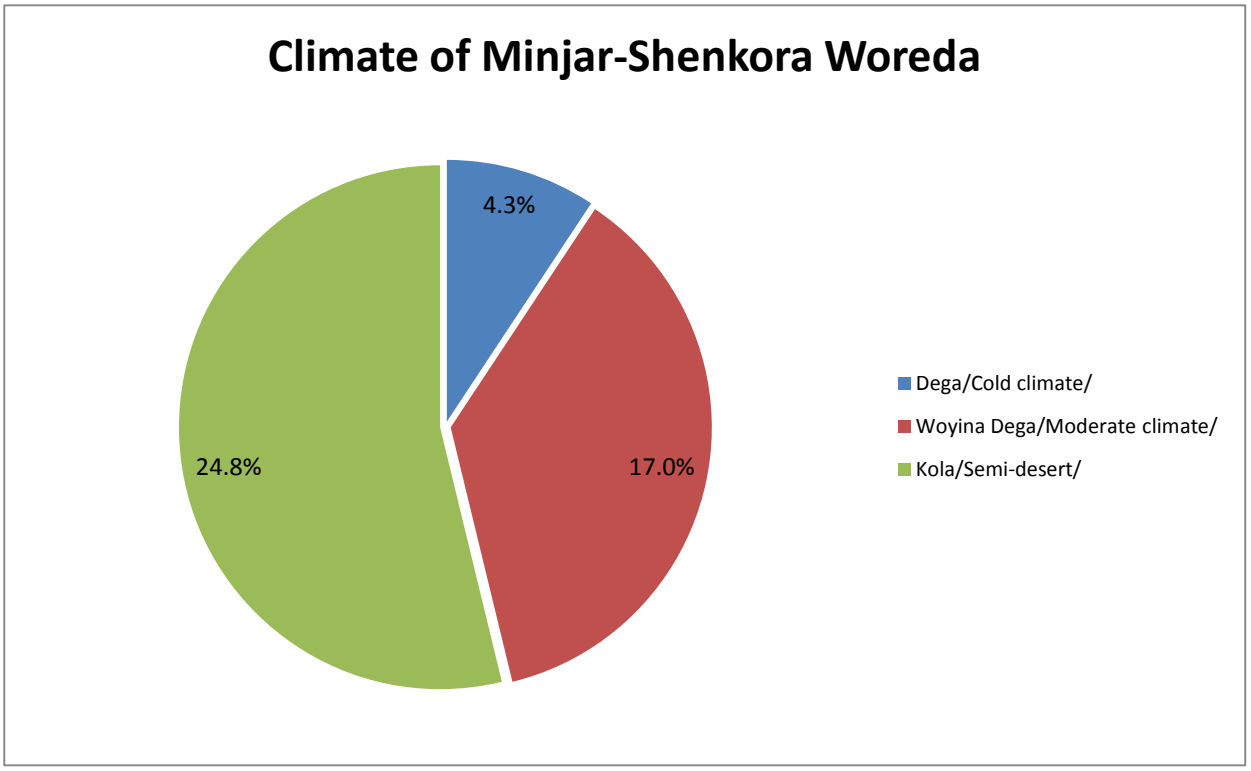


**Figure 5: Climate of Minjar-Shenkora Wereda**

**Source:** MSDARDB(2014)

According to North Shewa Agricultural and Rural Development Bureau, Minjar Shenkora district has annual average temperature range between $13.21^0$c and $23.02^0$c.

The amount of rainfall is collected in Ararti meteorology station, which is located in the administrative town of the study area. Whilst on the contrary there is no complete yearly rainfall data compiled by National Meteorological Agency (NMA) since the year 2005. As it is depicted on Table 3, based on five years (2000-2004) average rainfall data from NMA, Minjar Shenkora district receives the highest rainfall amount per annum in the summer season from June to August or locally known as Kiremt, its share is composed of 65 % of the total rainfall. It is during summer season that most agricultural activities are carried out and the main grains in the area are produced by the local farmers. The second highest amount of rainfall in the study area is recorded in the spring season from March to May or locally known as Belge, it covers 16.6 % of the total rainfall that the local area obtains in a year. In autumn (locally Tsdey season) from September to November months Minjar Shenkora district receives 12.95 % of rainfall per year. Whereas in winter season (locally it is called Bega) is very dry having a share of 5.44 % out of the total rainfall in a year.

Table 1: Amount of Rainfall between 2000E.C. and 2004E.C.

| Year | Jan | Feb | March | Apr | May | June | July | Aug | Sep | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2000EC** | 0 | 0 | 21.2 | 36.1 | 41.6 | **54** | **241.5** | **189.5** | 79.5 | 49.7 | 44.6 | 8.1 | 2765.4 |
| **2001EC** | 0 | 24.3 | 125.4 | 15.6 | 40.2 | **40.2** | **248.7** | **167** | 33.2 | 1.1 | 0 | 5.6 | 2702.3 |
| **2002EC** | 3.8 | 0 | 51.1 | 31.5 | 0 | **8.1** | **165.8** | **199.8** | 112.4 | 0.8 | 0 | 44.1 | 2619.4 |
| **2003EC** | 29.5 | 25.7 | 10 | 71.2 | 7.5 | **63.3** | **327.3** | **348.6** | 74.7 | 0 | 0 | 47.5 | 3008.3 |
| **2004EC** | 24 | 4.4 | 81.9 | 129.9 | 0.2 | **0.2** | **262** | **266.1** | 53.1 | 26 | 42.5 | 0.4 | 2910.4 |
| **Total** | **1.46** | **10.88** | **57.92** | **56.86** | **17.9** | **17.9** | **249.06** | **234.12** | **70.58** | **15.52** | **17.42** | **21.14** | **799.16** |

**Source:** National Meteorological Agency (2014)

As it is revealed on figure 6 the main rainy season in the Minjar Shenkora District ranges from June up to August months (summer or locally known as *kiremt*) it is at this time that teff is cultivated in the area

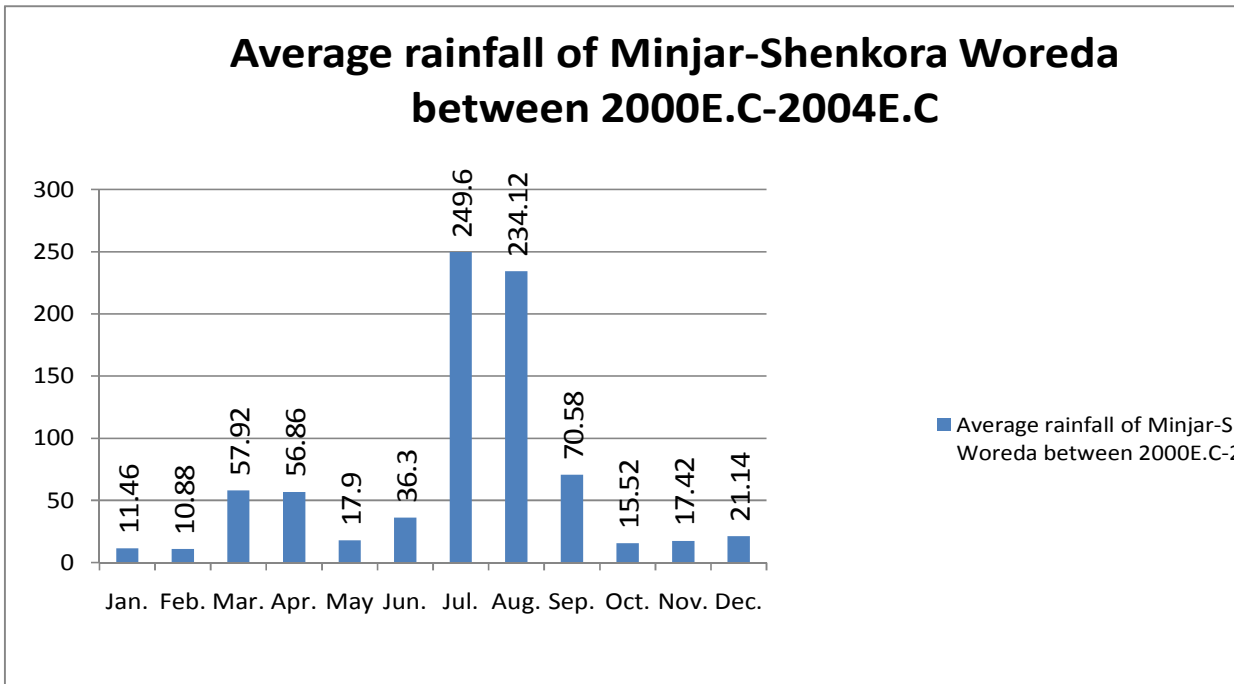


**Figure 6: Five Year's Average Rainfall of Minjar-Shenkora Wereda**

**Source:** National Meteorological Agency (2014)/

## 2.2 Socio-economic conditions

### 2.2.1 Economic activities

According to the Central Statistics Agency (CSA) of Ethiopia (2007) census report on Amhara region, the total population of MSW is 128,879. The number of rural dwellers of the study area is 116,642, which holds the largest portion of the total population of the whole area. As a result of this the livelihood of the largest number of households in the area depends on the agricultural activities which accounts about 93.72 % (Table 4) of the total number of household in the study area. A very small number of the total population of the area depend on other non-agricultural activities like trade, handcraft and daily laborer the portion of house hold engaged in these are 3.9%, 1.16 % and 0.60 %. While the rest 0.60 % of the total house hold depend on other socio-economic activities.

### 2.2.2. Ethnic distribution of the wereda

The ethnic distribution in the population of the Minjar Shenkora district comprises few ethnic groups which include Amhara and Oromo as well as some immigrants from other parts of the country. Among the languages used in the study, Amharic is spoken as a first language by 94.6% of the population, 5% of the population speaks Oromifa and 0.4% of the population speaks Argoba.

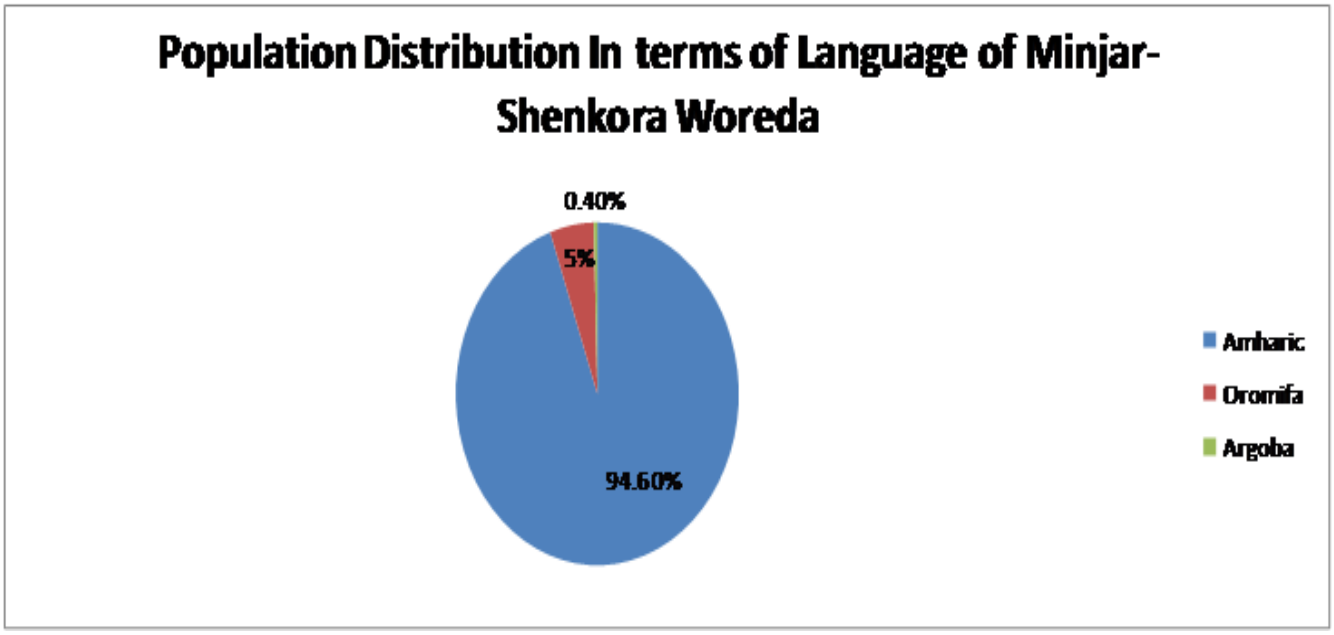


**Figure 7:** Population Distribution in Minjar-Shenkora Wereda

Source**:** MSDARDB(2014)

According to the 2007 census report of CSA, there are different numbers of religions followed the population of the study area, the most dominant religion is Orthodox having followers of 91% of the total population; while other religions like Islam and Protestant have followers in the area accounting 7% and 2% respectively of the total population.

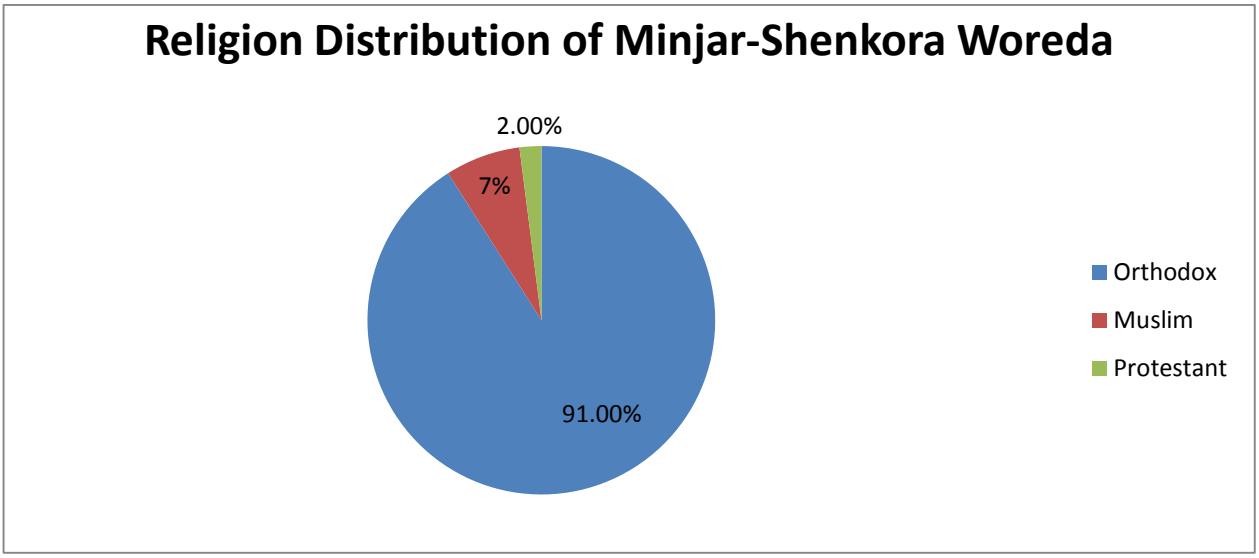


Figure 8: **Religion Distribution in Minjar-Shenkora Wereda**

**Source:** MSDARDB(2014)

# CHAPTER THREE

## *3. REVIEW OF THE LITERATURE*

In this chapter a large body of literature is reviewed under the headings of definitions and measurements; significance and impacts of green revolution technologies, experiences on modern agricultural technologies adoption and agricultural productivities in developing countries in general and in Ethiopia in particular. Finally, conceptual framework of the research is developed based on the reviewed literature.

### 3.1. Agricultural Productivity

The decision making process of subsistence farmers is a critical factor in designing agricultural policy in developing countries. It is important considerations for most developing countries, to give emphasis for smallholder farmers since factor of productive resources are very low.

Agricultural productivity as defined by Conway et al, (1990) is the output of valued products per unit of resource inputs. The three basic resources are land, labor and capital. Strictly speaking, energy is assumed under land (solar energy), labor (human energy) and capital (fossil fuel energy). Similarly, technological inputs such as fertilizers and pesticides are components of capital, but both energy and technology can be treated for many purposes as separate inputs Conway et al (1990). To sum up, agricultural productivity is the efficiency of factors of agricultural production per unit area.

There are a number of different options to measure productivity of an activity depending on the nature of the product and the resource being considered in the production process. However, the common measures of productivity are yield or income per hectare or total production of goods and services per household or nation. Yield may be in terms of kilograms of grain (tubers, leaves, meats, etc.) or any consumable or marketable product. Alternative yield may be converted to values in calories, proteins or vitamins or to its monetary values at the market (Conway et al, 1990).

Therefore, in this research agricultural productivity is a measure of the efficiency with which agricultural inputs are used in agricultural production, i.e. crop production. However, the measurement of the parameter depends on the nature of the agricultural inputs being considered.

### 3.1.1 Small Farm Households

The concept of small farm household can be approached from different angles. The following are some of the examples which illustrate the different conceptual approaches to small farm households:

- The World Bank's Rural Strategy defines smallholders as those with a low asset base, operating less than 2 hectares of cropland (World Bank, 2003);
- A study by FAO defines smallholders as farmers with "limited resource endowments, relative to other farmers in the sector" (Dixon et al, 2003);
- Narayanan et al, (2002) characterize a smallholder "as a farmer (crop or livestock) practicing a mix of commercial and subsistence production or either, where the family provides the majority of labor and the farm provides the principal source of income".

Most of the above definitions of small farm household are applicable to Ethiopian situation. Therefore, the concepts of small farm household in this thesis is to mean farmers who own or rented a farming land, with a maximum land holding size of less than or equal to two hectares, engaged in crop and animal production predominantly for subsistence, and the source of labor is mainly the member of the household.

### 3.1.2 Factors affecting the adoption of technology in Sub-Sahara Africa house hold farming

The main factors affecting technology adoption among smallholders in Sub-Saharan Africa are assets, vulnerability, and institutions (Meinzen-Dick et al., 2004).

#### 3.1.2.1 Farmers' level of vulnerability to modern agricultural technology

Vulnerability factors deal with the impact of technologies on the level of exposure of farmers to economic, biophysical and social risks (Meinzen-Dick et al., 2004). Those technologies that have a lower risk have a greater appeal to smallholders who are naturally risk-averse (Meinzen-Dick et al., 2004). It has been conceded that traditional smallholder farmers have their reasons for not adopting untried technologies. Most of the time, such reasons are quite rational (Mazonde, 1993). These farmers are well aware, for instance, that a sudden upswing in the productivity of their fields is likely to deplete the soil nutrients, which would result in much lower returns in the following agricultural season (Mazonde, 1993). In other words, use of high yielding grain varieties is consciously or sub-consciously perceived with prejudice by most traditional farmers (Mazonde, 1993). Application of pesticides is also less frequent for that reason.

#### 3.1.2.2. Farmers' asset possessions

These factors deal with whether farmers have the requisite physical (material) and abstract possessions (e.g. education) essential for technology adoption. A lack of assets will limit technology adoption (Meinzen-Dick etal., 2004). Researchers, policy makers and development practitioners therefore need to put more emphasis on the development of technologies with little requirements for such material and abstract possessions (Meinzen- Dicket al., 2004). Policy makers and development practitioners should also promote technologies with low asset requirements as they are likely to have higher adoption rates among poor farmers (Meinzen-Dick et al., 2004).

#### 3.1.2.3. Institutions

Institutional factors deal with the extent or degree to which institutions impact on technology adoption by smallholders (Meinzen-Dick et al., 2004). Institutions include all the services to agricultural development, such as finance, insurance and information dissemination. They also include facilities and mechanisms that enhance farmers' access to productive inputs and product markets. Institutions also include the embedded norms, behaviors and practices in society (Meinzen-Dick et al., 2004). Researchers and development practitioners should also consider issues that relate to the farmers' exposure to economic, agro-meteorological, biophysical and social shocks in designing technologies for smallholders. Care should be taken to avoid technologies with a high investment cost structure which smallholders cannot afford because they are poor and lack the necessary resources (Meinzen-Dick et al., 2004). Grain insurance can to some extent lessen the risk of farmers' exposure to external shocks (Meinzen-Dick et al., 2004).

Embedded norms, behaviors and practices in society can encourage or discourage adoption of a particular technology by members of that society (Meinzen-Dick et al., 2004). For example, the practice that the production of certain types of grains are the preserve of male members of society can limit the adoption of a particular technology in Sub-Saharan Africa if the grain to be promoted is grown mainly by men. This is because women constitute the majority of rural dwellers in this part of Africa. Clearly therefore, an understanding of local cultural practices and preferences is important if they are to benefit from agricultural research (Meinzen-Dick et al., 2004).

#### 3.1.2.4. The effect of gender

Results of studies in sub-Saharan Africa have shown that male headed households have more access to land, education, and information on new technologies (Bisanda & Mwangi, 1996). There is a strong association between the gender of the household head and adoption of technological

recommendations (Bisanda & Mwangi, 1996). In some countries female- headed households are discriminated against by credit institutions, and as such they are unable to finance yield-raising technologies, leading to low adoption rates (Mkandawire, 1993). There is clearly a case for improving current smallholder credit systems to ensure that a wider spectrum of smallholders are able to have access to credit, more especially female-headed households (Mkandawire, 1993). This may, in certain cases, necessitate designing credit packages that are tailored to meet the needs of specific target groups (Mkandawire, 1993).

#### 3.1.2.5. The role of stakeholders

It is imperative that agricultural training and extension programmes be intensive enough to promote adoption not only of improved yield-raising technologies, such as improved seeds, but also of fertility-restoring and conservation technologies (Nkonya et al., 2004). Synergies need to be created between government departments, non-governmental organizations, researchers, donors and local communities in implementing programs that promote smallholder farmers' adoption of technologies which can increase agricultural productivity and reduce environmental degradation and the deterioration of soil quality (Rosegrant et al., 2002; Nkonya et al., 2004).

Measures that can be taken to increase adoption of yield-enhancing technologies include:

(i) lowering fertilizer costs;
(ii) lowering the price of other inputs and raising agricultural product prices;
(iii) improving smallholder farmers' access to finance for agricultural development;
(iv) adopting a "package" approach to provision of agricultural development technologies; and
(v) development and rehabilitation of infrastructure for agricultural inputs and product markets (Nkonya et al., 2004; Rosegrant et al., 2002).

#### 3.1.2.6. Extension workers' level of training

A major problem in sub-Saharan Africa is that year after year extension workers who are hardly afforded in-service training, and is loosely linked to research; continue to disseminate the same messages repeatedly to the same audience (Mkandawire, 1993). A situation has consequently arisen where the disseminated messages to the majority of the extension audience, have become technically redundant and obsolete (Mkandawire, 1993).

An additional problem is that most extension services tend to focus on the well-resourced, wealthier farmers and perceive farmers as simply agents of change (Mkandawire, 1993).

The major option for increased adoption of technology is to overcome the income/ capital constraint through increased credit provision (Mkandawire, 1993). However, one of the most discernible features around credit in most sub-Saharan African countries is the lack of an educational package linked to credit for small rural producers (Chidzonga, 1993).

The cost of technology is a major constraint to technology adoption (Bisanda & Mwangi, 1996). The elimination of subsidies on prices of seed and fertilizers since the 1990s due to the World Bank-sponsored structural adjustment programs in sub-Saharan Africa has worsened this constraint (Chidzonga, 1993; Bisanda & Mwangi, 1996; Nkonya et al., 1996; Akulumika et al., 1996).

## 3.2. Significance and Impacts of the Green Revolution Technologies

Improving seeds through experimentation is what people have been up to since the beginning of agriculture, but the term "Green Revolution" was coined in the 1960s to highlight a particularly striking breakthrough. In test plots in northwest Mexico, improved varieties of wheat dramatically increased yields. With a big boost from the International Agricultural Research Centers created by the Rockefeller and Ford Foundations, the "miracle" seeds quickly spread to Asia, and soon new strains of rice and corn were developed as well (Frances et al, 1998). The miracle seeds of the Green Revolution increase grain yields and therefore are a key to increase income for smallholder farmers. By the 1970s, the term "revolution" was well deserved, for the new seeds-accompanied by chemical fertilizers, pesticides, and, for the most part, irrigation-had replaced the traditional farming practices of millions of Third World farmers (Frances et al, 1998). Overall, it was estimated that 40 percent of all farmers in the Third World were using Green Revolution seeds, with the greatest use found in Asia, followed by Latin America (Frances et al, 1998). Clearly, the production of crops using the Green Revolution Technologies considerably increasing grain yields. Much of the reason why these "modern varieties" produced more than traditional varieties was that they were more responsive to controlled irrigation and to petrochemical fertilizers, allowing for much more efficient conversion of industrial inputs into grains. However, some of the more recently developed seeds may produce higher yields even without manufactured inputs, but the best results require the right amounts of chemical fertilizer, pesticides, and water. Thus, adoption of wide varieties of agricultural technologies increases farm productivity (Frances et al, 1998). But, introducing any new agricultural technology into a social system stacked in favor of the rich and against the poor-without addressing the social questions of access to the technologies. Moreover, adoption of the green revolution technologies heavily depends on the cultural and agro-ecological conditions of

particular areas. However, once on the path of adopting green revolution technologies, farming operation costs more. It can be more profitable, of course, but only if the prices farmers get for their crops stay ahead of the costs of chemical fertilizers, pesticides, improved seeds and machinery (Frances et al, 1998).

Crop productions that depend heavily on chemical fertilizers do not maintain the natural fertility of the soils and because pesticides generate resistant pests, farmers need ever more fertilizers and pesticides just to increase more production per hectare. Therefore, a revolution of this magnitude was bound to create problems of its own. Generally, some of the critics of the green revolution as identified by the International Food Policy Research Institution (IFPRI, 2002) are listed below:

- Critics of the Green Revolution argued that owners of large farms were the main adopters of the new technologies because of their better access to irrigation water, fertilizers, seeds, and credit. Small farmers did lag behind large farmers in adopting Green Revolution technologies, yet many of them eventually did so.
- Another shortcoming of the Green Revolution was that it spread only in irrigated and high-potential rain fed areas, and many villages or regions without access to sufficient water were left out.
- The Green Revolution has also been widely criticized for causing environmental damages. Excessive and inappropriate use of fertilizers and pesticides has polluted waterways, poisoned agricultural workers, and killed beneficial insects and other wildlife.
- The green revolution heavily dependent on a few major cereal varieties has led to loss of biodiversity on farms. Some of these outcomes were inevitable as millions of largely illiterate farmers began to use modern inputs for the first time, but inadequate extension and training, an absence of effective regulation of water quality, and input pricing and subsidy policies that made modern inputs too cheap and encouraged excessive use also created negative environmental impacts.

Generally, one of the alternatives to create viable and productive small farm households agricultural productivities is using the principles of agro-ecology. That is the only model with the potential to end rural poverty, feed everyone, and protect the environment and the productivity of the land for future generations.

Often ignored, however, is the positive impact of higher yields in saving huge areas of forest and other environmentally fragile lands that would otherwise have been needed for farming activities. The researchers argument is that use of appropriate green revolution technologies for crop production is sound in Africa in general and Ethiopia in particular. This is because of the rapidly growing population growth both in rural and urban areas, expansion of farming lands leads to decrease of common grazing lands, deforestation and desertification causes agricultural productivity to decline. As a result smallholder farmer crop production is unable to feed its family. Therefore, adopting green revolution technologies have paramount importance in order to boost small holder agricultural production in Ethiopia in general and in minjar-shenkora wereda in particular.

To summarize, the Green Revolution is a major achievement for many developing countries and gave them an unprecedented level of national food security through agricultural intensification. It represented the successful adoption and transfer of the same scientific revolution in agriculture that the industrial countries had already been used for themselves. But experiences of many countries showed that sizable proportion of the green revolution technologies are suited for limited agro-ecological environments, and socio-economic groups. Therefore, adoption of appropriate green revolution technologies increases crop productivity. In regard to this, agricultural research remains a potent force for good in the developing world and is the key to increasing yields further to meet the continuing growth of food needs in developing countries in general and Ethiopia in particular. This need is especially urgent in Sub-Saharan Africa, which has yet to experience an agricultural revolution of its own through farmers' participatory research and technology generation. New technologies will also need to be more environmentally sustainable.

### *3.3.* Experiences of Developing Countries on Modern Agricultural Technologies Adoption

Studies on the experiences of modern agricultural technologies adoption focusing on farm household is quite a recent phenomenon in almost all developing countries, despite its importance in enhancing agricultural productivity. Most experiences on modern agricultural technologies adoption related to "the Green revolution technology" and farmers' response to it. In regard to this some of the experiences on utilizing newly introduced agricultural technologies and intervening factors of modern agricultural technology adoption were reviewed.

Most adoption studies in developing countries indicated that education level of the household head's has a positive and significant effect on adoption decision of modern agricultural technologies Jha et al, (1990). This is because of the fact that in the absence of effective extension

service delivery and availability of complex technologies education has an important role in determining farmer's decision to adopt.

The effect of household age as determinant of adoption decision depends on experience of the household head on farming activities. Older farmers have experience and resources that would allow them more possibilities for trying out new technologies. On the other hand, younger farmers are more likely to adopt new technologies because they have more attainment of education than the older generations, so that they can understand the use and importance of the technologies. Concerning age of household head as determinant factors of adoption of modern agricultural technologies different authors have reported quite opposing results. For instance, Jha et al (1990) reported negative relationship between technological adoption and the age of the household head. But, Zegeye (1989); Morris et al, (1999) and Mahabub (1988) found that a positive association between the decision of technological adoption and the age of the household head. They argued that older farmers have more experience and hence better knowledge of the use of modern agricultural technologies than younger farm household head. Therefore, the effect of age on adoption decision depends on specific conditions in the population and area where the new technologies are introduced. Hence, in less developed countries where most of the farmers are not educated, the role of experience should not be underestimated in analyzing factors that affect adoption of modern technologies.

In developing countries where farmers have only limited capacity to finance an investment in new technologies the role of access to credit cannot be overestimated (Feder et al, 1985 and Howard et al, 1995). In regard to this almost all the literature reviewed indicated that farmer's accessibility and availability to credit use have positive and strong association with the decision of households. Moreover, Makokaha et al (2001) studied the determinants of fertilizer and manure use for maize production in the Kiambu District, Kenya. In the study the researcher found that, the factors like farmer's age, extension contact, membership in an organization, and off-farm income have significant influence on adoption of fertilizer. While extension contacts and off-farm income were significant factor in affecting the adoption of manure. Therefore, the reviewed literature implies that there are several factors which obstruct farm households from adopting modern agricultural technologies.

### *3.4.* Lessons on Modern Agricultural Technologies Adoption and Crop Productivities in Ethiopia

Previous works of many researchers have discussed the relationship between adoption of agricultural innovations and factors that affect the decision to adopt. This includes, more or less, socio-economic and cultural characteristics, psychological characteristics, and institutional structure. In Ethiopia there are few research reports on adoption of modern agricultural technologies in different parts of the country, moreover the existing literatures were concentrated in areas where adoption rate is high. Thus, reviewing some of the literatures has paramount importance in this study.

Mulugeta (1999) studied the relative importance of the variable influencing farmers' training, education and adoption of new technologies. He found that the factors significantly determine adoption of improved seeds and fertilizers were educational level of household head, farm size of the household, participation in agricultural extension programs and farm income. Among the different factors that determine small holders agricultural productivity in Ethiopia; the findings of Geremew (2000) shows that distance from all weather road and price of output were the most important determinants of agricultural productivity in Aroressa, Sidama Zone. While number of plough, farm size and wealth are the major determinants of agricultural productivity in Hula, Sidama Zone. Moreover, wide coverage study made by Mulat et al (2003) to determine yield of major cereals in Tigray, Amhara, Oromiya and Southern Nations Nationalities and Peoples. They reported that DAP and Urea alone are not solutions for increasing agricultural productivity in Ethiopia. The contribution of extension to yield is not-significant other factors remain constant. Moreover, the finding has shown that, among different explanatory variables farmers education is significant and positive coefficient in determining agricultural productivity. The rate of fertilizer application, quantity of labor used, and use of herbicides and sex of the household were found to be significant determinants of teff and wheat but ownership of oxen were not-significant. In case of barely fertilizer coefficients was not-significant but contact with extension, literacy, farm size, seed rate and labor intensity positively affect the productivity of barely.

Adoption of inorganic fertilizer on maize in Amhara, Oromia, and Southern Regions, was studied by Tesfaye (2004). He explained that farm experience, access to credit, use of improved crop varieties, use of farm yard manure, family size, level of education and total farm size significantly influencing adoption of chemical fertilizer. Moreover, a study on adoption of improved technologies in Ethiopia by Assefa et al (2004) reported that age of farmer and distance from the

market center has negative impact on adoption decision of the technologies. While, determinant factors like household size, farm size and farmers contact with extension agents have strong and positive effects on the adoption of improved technologies in Ethiopia. But formal education, number of oxen owned and credit were found to be non-significant determinants of farmers' decision. Moreover, Workneh (2000) reported that proximity to input supply center, income status were significant determinants of adoption while extension frequency and literacy were non-significant determinants of adoption of Bunigne teff.

Recently, Ashenafi (2006) studied the determinants of modern agricultural input adoption and their productivity in Tigray and Amhara Regions. Among many explanatory variables that affect farmers' decision of modern input adoption, extension contact affects the decision of modern inputs positively and significantly. Moreover, the research reported that the variables like; labor, sex, age, land size, number of ox, credit, other income, radio, religion, educational dummies were found to be non-significant in determining the decision to adopt modern agricultural inputs in Tigray. He uses the same factors to assess the most important determinants of adoption decisions in Amhara region. Hence, the number of oxen owned, extension contact, and educational status were found to be positively and significantly affect adoption decision of the households'. Moreover, he assumed all factors that affect the behavior of adoption decision of modern inputs in both regions were also determining crop productivity. Based on the findings of the research land holding size has negative and significant effect on the level of farm productivity in Tigray region. Whereas, the number of oxen owned, off-farm incomes, radio as source of information and credit were positively and statistically significant effect on the level of productivity in Tigray. Although labor and education have positive signs and age of the household negative signs their effect is statistically insignificant. Moreover, all the determinants of agricultural productivity that were used in Tigary were also applied in Amhara region. According to the findings, land holding size and sick family members in the households have negative effect on agricultural productivity. In addition, number of oxen owned and economic status of the household have positive effect on the level of agricultural productivity. The variables like age and sex of household heads, and labor supply extension contact, other income, distance to input and radio were found to be insignificant. The implication is that different factors affect adoption of modern agricultural technologies in different spatial areas.

Generally, there are large bodies of theoretical and empirical literature on adoption of innovation in general and agricultural technologies in particular. Adoption of modern agricultural technologies required to improve agricultural productivity in general and small holders in particular. Therefore,

the reviewed literatures are relevant to understand the different factors that affect adoption of modern agricultural technologies and crop productivities. In addition, it is essential in identifying and selecting the most important variables that could affect adoption of modern agricultural technologies and crop productivities in the study area. Moreover, the literatures are also vital in comparing the findings of this research with the works of other researchers in the same area or across spatial areas.

### *3.5.* Conceptual frame work

Adoption decision are made at the household level so it is imperative to understand the set of factors which influence household decisions of accepting or rejecting of a particular agricultural technologies. Adoption pattern of agriculture technologies are not uniform at household level, especially subsistence farming was governed by a set of complex factors such as socio-economic, cultural, agro-ecological and institutional characteristics. This research bases the general pattern of modern agricultural technologies adoption, especially fertilizer, improved teff and/or wheat seeds and herbicides by taking small farm households decision towards adoption of these technologies and the contribution of these technologies to crop productivities. Hence, analyzing these processes needs to frame the research into major areas where the researcher has to focus, to address the research questions. Thus, the conceptual framework to study factors affecting modern agricultural technologies adoption and crop productivities are categorized as: Socio-economic and demographic characteristics (age of household head, availability of labor supply, number of ox owned, land holding size, availability of off-farm income). Institutional characteristics (the ratio of price of outputs and cost of inputs, condition of land tenure, condition of credit use, distance to the market center and condition of extension contact). Agro-ecological characteristics include condition of rainfall distribution and condition of soil fertility. This research assumes that the factors mentioned above have interplay with small farm household's decision on adoption of modern agricultural technologies and crop productivities. Therefore, households decision whether or not to adopt a given technologies are based on careful evaluation of these variables which determine directly or indirectly the decision of modern agricultural technologies adoption and crop productivities. Based on this assumption, the conceptual framework of the research is presented below.

# CHAPTER FOUR

## *4. METHODS AND MATERIALS*

### 4.1. Types and sources of data

Data for this study was captured from two sources which were primary and secondary data. The majority of primary data was collected from selected farmers through focused group discussion (FGD), structured interviews and field observation. Other informants-zonal and district agricultural experts, *kebele* administrators and development agents (DAs) - were also source of primary data. In addition documents, annual grain production and input application reports from NSZARDB and MSDARDB; population census reports from CSA; purchased climatic data from head office of Ethiopian Meteorological Agency and experiments and research reports on house hold farming in Ethiopia.

### 4.2. Methods of data collection

The following data collection tools were employed for the purpose of gathering relevant data for further analysis.

#### 4.2.1. Field observation and informal interviews

It was conducted by the researcher aiming to understand the local communities of small holders' resource management practice and adoption level of new agricultural technologies. On his way the researcher took notes on soil color, topography of the land, land use and on the type of on farm support provided by Informal interviews were carried out in infrequent manner with the farmers met occasionally for the purpose of getting information to produce a structured questionnaire which is used as a major tool for data gathering.

#### 4.2.2 Structured interviews

The major instrument used for data collection was structured interview with questions which are carefully constructed. On the bases of information acquired during informal interview with farmers and field observation, and from readings of related literatures structured questionnaire (Annex A) was constructed for data collection from the households in the wereda. All these data have been collected by me.

### 4.2.3. Focused group discussion

The main aim of FGD is to identify factors that affect resource management of small holders farming in the study area. In the FGD development agents (DA), farmers from the two sample Kebeles and extension workers were participated. The researcher presented various open ended questions to the participants of the discussion.

### 4.2.4. Key informant interview

Purposively the researcher selected 16 respondents who can be able to provide detail information regarding on the crop production system, animal husbandry system and land husbandry system of the study area. These include eight development agents from sample *kebeles,* three officers from district agriculture and rural development bureau and five village leaders.

## 4.3. Methods of data analysis and presentation

Both qualitative and quantitative methods were used in order to analyze collected data through structured interview and focused group discussion. The quantitative data collected from the sample respondents were processed by excel.

Simple descriptive statistics such as percentage, mean, frequency and graphs were used for analysis.

# CHAPTER FIVE

# 5. RESULTS AND DISCUSSIONS

Results and discussions of the structured interview and focus group discussion which was held with extension workers, development agents and selected farmers from each sample Kebeles. The two sample Kebeles are Cherecha Kebele and Dire Kebele.

In the interview and discussion processes, I have tried to understand the challenges and opportunities of the two sample Kebeles in terms of the following key agricultural elements which are;

## 5.1 Demographic Dynamics and Food Security

### 5.1.1. Demographic Dynamics

Based on the 2007 census result conducted by Central Statistics Agency (CSA), (Table 7) the rural area of Minjar Shenkora woreda has total population of 116,642 of which 60,895 or 52.2% are males and 55,474 or 47.8% are females. The total urban dwellers of the study area is 12,237 of this 6,023 or 49.2 % are males and 6,214 or 50.8 % are females (CSA, 2007).

**Table 2: : Population distribution of Minjar-Shenkora Wereda**

| Area | Male | Percentage | Female | Percentage |
|---|---|---|---|---|
| Urban | 6023 | 49.22 | 6214 | 50.78 |
| Rural | 60895 | 52.2 | 55747 | 47.8 |
| Total | 66918 | 51.93 | 61961 | 48.07 |

**Source:** CSA (2007)

### 5.1.2. Food Security

Since agriculture is the major economic activity in the study area the main grains produced are Teff, Chickpea, Wheat and Lentil. Minor grains produced with a very small quantity in Minjar Shenkora district are Barley, Maize, White bean and beans.

Among the 24 woredas in the North Shewa Zone, Minjar Shenkora is the well known area for its highest Teff production. According to the report made by MSDARDB in the 2013/2014 croping season in the study area a total of 55,860.38 hectares of agricultural land was covered with varies grains. According to the data on Tables 8 and 9, in the study area 19,152.27 hectares of agricultural

land was covered by the production of Teff. The total amount of Teff harvested in the area is about 420,839.1 quintals, this is the highest yield amount recorded among all woredas in the North Shewa Zone, as a result Minjar Shenkora district is the leading woreda (district) in Teff production. The wereda is also rich in the production of other food stuff. Therefore food security is not the issue in the wereda.

## 5.2 Dynamics of asset Owernership

### 5.2.1 Land Ownership

Land is the major productive resource that determines the livelihoods of households in rural Ethiopia. Unlike other areas of the country, since the land redistribution of the 1975, farmers have relatively enjoyed security of land tenure. According to the survey and discussion with peasants, no official land redistribution has been conducted in the Woreda. Although the PA still has the responsibility of allocating land to the landless, there are few instances of this and when they occur, land is not redistributed from the existing holdings. Since in the Woina-Dega and Dega areas no spare agricultural land exists, new land allocations have taken place on very marginal, communal, forest or grazing lands, which are essentially less productive.

The situation of land holding and land ownerships is getting more fragmented over the past two decades mainly due to rapid population growth.

Land holders means individual, group of people or community, government body with the legal personality having a possession right over a rural land. There are four major types of land holdings in the wereda, these are:

**A. Institutions Holding:** These are the type of holdings owned by government or non government institutions such as : schools, health centers, credit associations and the like.

**B. Communal Holding:** means rural land which is out of the ownership of the government or private holding and used by the local people in common for grazing, forestry and other social services.

**C. Common Holdings:** means holding of land by two or more persons in common having the holding right, and use without division by sharing the output from the land.

**D. Private Holdings:** means a land possessed by any farmer or other body vested with right to use it and existing under private holding having a certificate.

**Table 3: Proportions of Landholdings in minjar-shenkora wereda.**

| No | Land holders | Number of owners | Number of farm lands Owned | Area of the farm land in hectar |
|---|---|---|---|---|
| 1 | Institutions<br>1.1 government | 115 | 246 | 896.35 |
| | 1.2 non government | 111 | 199 | 478.9 |
| 2 | Communal land holders | 40 | 489 | 58,645.208 |
| 3 | Common land holders | 292 | 1,227 | 908.8 |
| 4 | Private land holders<br>4.1 Male and female | 3,867 | 1,988 | 5,761 |
| | 4.2 Male only | 2,068 | 7,318 | 2,772.35 |
| | 4.3 Female only | 2,642 | 8,476 | 5,783 |

**Source:** MSDARDB(2014)

Unregulated population growth has many impacts on the socio-economic well-being of a given society. Less developed countries like Ethiopia, which have predominantly an agrarian economy, are more vulnerable to the impacts of rapid population growth. Rapid population growth greatly affects the size and fertility of agricultural land, which in turn causes food insecurity in a given country.

Landholdings have been reduced markedly over the last three decades due to the large family size, and most of the next generation of farmers in the wereda stands to inherit agricultural units, which will have little or no chance of viability. The system is clearly near breaking point and it is difficult to see how it can continue for much longer.

Due to the total decrease in landholding, cultivated land has also declined from year to year in the Woreda.

**Table 4: Changes in size of Landholdings since 1992, minjar-Shenkora wereda**

| Year | Changes in the Size of Landholding | | |
|---|---|---|---|
| | Better off 0.25ha and below | Medium 0.25-0.5ha | Poor below 0.5ha |
| 1992 | 28% | 33% | 39% |
| 2001 | 66% | 25% | 9% |

**Source:** MSDARDB(2014)

The individual landholdings between 1992 and 2001 in the woreda show a continuous decline due to the formation of new households that need farmland. For instance, in 1992, 39% of the households had above 0.5ha of land but in 2001 the proportion of households having above 0.5ha was decreased to only 9%. On the other hand, in 1992, 28% of the households had below 0.25ha of land but in 2001 this proportion had risen to 66%. Table 4 and fig.9 present changes in size of landholdings since 1992 in the woreda.

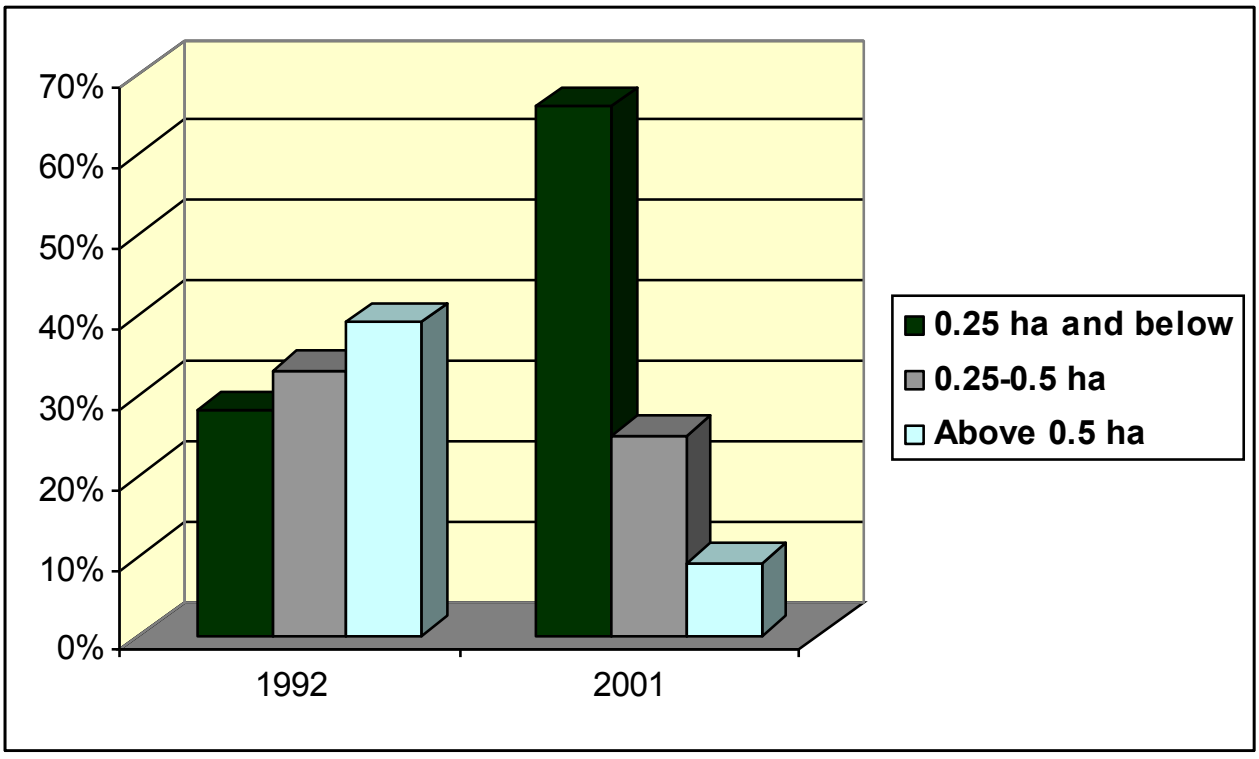


**Figure 9: Changes in Size of Landholdings since 1992, , minjar-Shenkora wereda**

Source**:** MSDARDB (2014)

Table Summarizes percentage distributions of household heads by size of landholding before 30 years, 20 years, 10 years and at present by peasant administrations. Before 30 years, 57.2% of the household heads had 0.5 to 1 hectare of land. But this proportion of household heads in this category of landholding had declined to 38.3% after 10 years; and again, this proportion of household heads had reduced to 18.9% after 20 years.

At present, the proportion of household heads owning 0.5 to 1 hectare of land size has decreased to 7.8%, and 73.9% of the households owned < 0.5 hectare. In general, in all categories of landholding, the proportion of household heads has shown a tremendous decline.

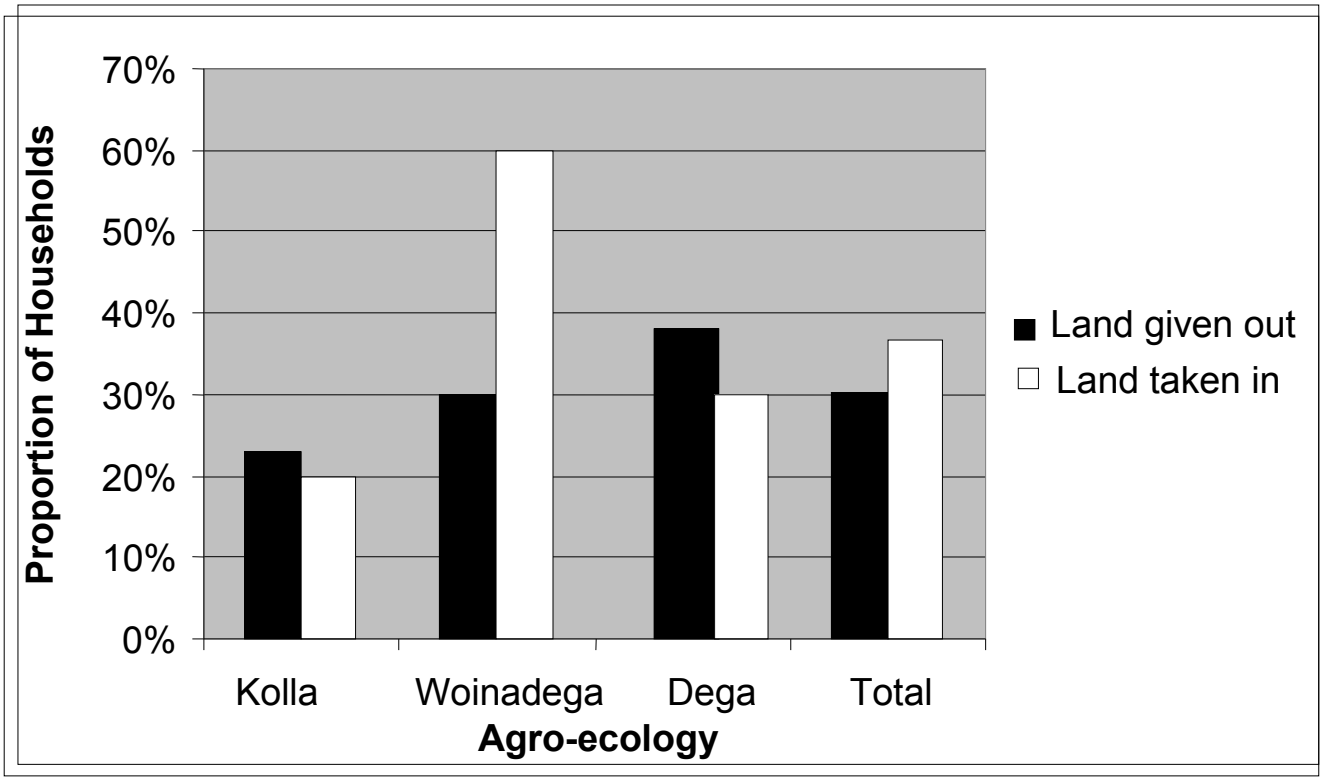


**Figure 10:** Propoportion of Households with Sharecropping Arrangement by Agro-ecology, Minjar-Shenkora Wereda

**Source:** MSDARDB(2014)

Inheritance is the major means of land acquisition in the Woreda, especially in woinadega and dega areas (60% and 40%, respectively). Land is registered in the name of the household head and shared among the sons either upon death of the father or is allocated by their father when the sons want to establish their own households. Daughters inherit land only if there are no male siblings. Inheritance passed down through generations has given rise to a continuous sub-division of land holdings and the individual plot sizes have become smaller and smaller. One key informant from the highland

agro-ecology reported that thirteen households now inhabit the place where only one household used to cultivate before some decades. This indicates the increasing population pressure on the agricultural land that affects food security situation of a household.

Although illegal and not openly discussed, there is a market for land transactions in the name of contract. Farmers widely practice leasing out part of their land on a contract or permanent basis to a neighbor. For example, about 27.3% of the surveyed households in lowland area obtained access to land through contract arrangement from a neighbor who has socio-economic problems such as purchase of food during famine, debt payment, sickness of family members, funerals, wedding, etc. Contract is an important strategy used by richer farmers to gain access to several plots of land in different localities and for various uses. This has necessarily involved dispossession of land from poorer farmers, exacerbating a pre-existing discrepancy in wealth among households.

Marriage to widows is another strategy to gain access to land. Widowed women register in the peasant administration and have rights to use their land. Women farmers need the assistance of male labor for most of the heavy farm activities, such as land preparation, cultivation and harvesting, etc. This is done through sharecropping arrangements or by help from relatives. What is most usual is the land of widowed women is not ploughed, sowed or harvested on time. Even relatives assist widowed women after they have finished their own farming activities. If the land of widowed women is not cultivated for years, there is suspicion among them that part of their land may be taken and given to landless people in the area. These difficulties and dependence on male labor force encourage new marriage arrangements. This gives opportunities for relatively richer farmers to gain access to land through polygamous marriages. In the highlands where land is the scarcest resource, marriage to widows is an important strategy for land acquisition, and is one of the justifications for the widespread practice of polygamy in the area, which in turn accelerates rapid population growth. As seen from Table 24, 18.3% of the highland and 9.3% of the midland respondents obtained access to land through marriage to widowed women. Marriage to widowed women in order to hold land is not common in lowland areas. This is probably due to the fact that land is not so scarce in lowlands.

### 5.2.2 Animal Husbandry

The wereda has large number of animal population; however their productivity is still lower compared to crop production the following table shows animal population of the wereda.

**Table 5:** shows number of population in the wereda in 2006 EC**.**

| No | Name of the animals | Number of animals |
|---|---|---|
| 1 | OX | 55,149 |
| 2 | Cow | 22,860 |
| 3 | Sheep | 56,606 |
| 4 | Goat | 69,589 |
| 5 | Donkey | 31,099 |
| 6 | Mule | 2,613 |
| 7 | Horse | 420 |
| 8 | Camel | 6,251 |
| 9 | Hen | 123,847 |

**Source:** MSDARDB(2014)

**Table 6: Animal husbandry in the sample two Kebeles of the wereda.**

| | **Cherecha Kebele** | **Dire Kebele** |
|---|---|---|
| Animal keeping and feeding system | Animals are kept in the enclosure of farmers' houses and they feed their animals (cattle) straw and some crop residue. | They do have a vast grazing area so that they can keep large number of animals (cattle). |
| Number of cattle | They do have less number of cattle since there is no enough grazing area for their cattle. Due to this reason, people are obliged to keep less number of cattle. | They do have a good number of cattle since there is vast grazing land. |
| Animal fodder | There is not enough animal fodder for their cattle even though they have high amount of crop productivity. | There is enough amount of animal fodder, because, there is high crop residue from the crop production. |

**Source:** MSDARDB(2014)

In the focus group discussion most of the respondents reflected that the system of animal husbandry is still at its infant stage even though there is a huge potential of animal productivity.

I have tried to visit few households to see how animals (cattle) are kept in the enclosure. I took the following pictures to show how animals are kept in.

**Figure 11: Way of Animal keeping in the enclosure within Cherecha Kebele**

**Source:**( author)

## 5.3. Trends of Crop Production

The amount of net revenue earned Per hectare of land from production of crops crop through modern row planting technology is significantly higher than that was produced through the traditional Broadcasting method with 20% difference. The input cost of crops production through row planting technology is lower than that of broadcasting method. This cost difference exhibited on the amount of crops seed rate applied by row planting technology is significantly lower than the amount of seed rate applied through the traditional broadcasting method. Wheat is also another widely grown crop in the wereda next to crops.

**Table 7: Main grains production in the study area in 2013/14 graining season**

| No | Major types of grains | Amount of grain production (in quintals) | Agricultural area covered | |
|---|---|---|---|---|
| | | | In hectare | In percent |
| 1 | Teff | 420,839.1 | 19,152.3 | 34.28 |
| 2 | Wheat | 600,601.6 | 11,1204 | 19.9 |
| 3 | Chick pea | 235,580 | 5,322.52 | 9.53 |
| 4 | Lentil | 95,032.2 | 4,204.13 | 7.53 |
| 5 | Barely | 59,576.7 | 2,402.89 | 4.30 |

**Source:** MSDARDB(2014)

**Table 8: shows main crops and area covered by the respective crops.**

| No | Crops name | Cultivated area in hectare | Amount if production In quintal |
|---|---|---|---|
| 1 | Teff | 16,603.2 | 317,276 |
| 2 | Wheat | 11,888 | 696,668 |
| 3 | Barley | 1,305 | 42,824.1 |
| 4 | Millet | 1,335 | 36,398.7 |
| 5 | Maize | 1,322.52 | 47,515.3 |

**Source:** MSDARDB(2014)

**Table 9: Crop Yield, area Coverage and Productivity, minjar-Shenkora wereda (2001/2002)**

| Types of crops Cereals | Area | | Production | | Yield |
|---|---|---|---|---|---|
| | Hectare | % | In quintal | % | Qt/ha |
| Teff | 1251.59 | 18.72 | 7194.73 | 2.4 | 5.75 |
| Barley | 79.05 | 1.19 | 392.6 | 0.13 | 4.93 |
| Wheat | 59.05 | 0.88 | 0 | 0 | 0 |
| Maize | 694.51 | 10.39 | 10272.22 | 3.43 | 14.79 |
| Sorghum | 599.46 | 8.97 | 4619.13 | 1.54 | 7.71 |
| Sub-Total | 2683.66 | 40.25 | 22478.68 | 7.5 | |
| **Pulses** | | | | | |
| Horse beans | 129.53 | 1.94 | 1072.76 | 0.35 | 8.28 |
| Field peas | 246.64 | 3.69 | 1394.27 | 0.47 | 5.65 |
| Haricot beans | 712.37 | 10.65 | 5373.49 | 1.79 | 7.54 |
| Chickpeas | 39.68 | 0.59 | 185.35 | 0.06 | 4.67 |
| Lentils | 4.95 | 0.07 | 12.46 | 0.004 | 2.52 |
| Sub-Total | 1133.17 | 17.0 | 8038.33 | 2.68 | |

**Source:** MSDARDB(2014)

**Table 10: Shows comparison of row planting and broadcasting method of planting**

| No | Names of crops | Areas under Row planting in hector | Amount of production in quintal | Areas used by broadcasting methods | Amount of product in quintal |
|---|---|---|---|---|---|
| 1 | Teff | 5,391 | 117,427 | 11,086.40 | 197,036 |
| 2 | Wheat | 7,848 | 476,990 | 4,018.20 | 215,990 |
| 3 | Barley | 521.1 | 18,657 | 708.645 | 21,206 |
| 4 | Millet | 508.5 | 18,531 | 831 | 17,867 |
| 5 | maize | 965.4 | 37,333.60 | 357 | 10,181 |
| 6 | Bean | 318.8 | 11,031.40 | 91.89 | 1,991.95 |
| 7 | Pea | 2510.5 | 9,212.90 | 2,212 | 72,226 |
| 8 | Lentils | 1,014 | 18,376 | 3,481.60 | 54,446 |

**Source:** MSDARDB(2014)

According to table 10, We can understand that row planting method is more effective method than broadcasting method.

**Table 11: Shows pulses and their cultivated area.**

| NO | Pulses name | Area of cultivated land | Amount of product in quintal |
|---|---|---|---|
| 1 | Bean | 413.69 | 13,787.90 |
| 2 | Chickpea | 228.04 | 5,462.83 |
| 3 | Lentils | 4,658.55 | 75,057.30 |
| 4 | Pea | 4,745.04 | 170,452 |
| 5 | Boloke | 826.13 | 13,933 |
| 6 | Masho | 217 | 2,774 |

**Source:** MSDARDB(2014)

From table 11 we can understand that, minjar-shenkora wereda is productive in pulses. Pea and lentils are the leaders in the production of pulses where as Masho is the least one.

**Table 12: Shows comparison of row planting and broadcasting method of planting**

| No | Production year | Cultivated land in hector | Expected production in quintals | Actual production | Fertilizers used | |
|---|---|---|---|---|---|---|
| | | | | | Dap | Urea |
| 1 | 1997 EC | 36,129.33 | 719,898 | 739,135.55 | 22,515.15 | 13,105.75 |
| 2 | 1998 EC | 36,129.33 | 1,295,637 | 813,692.60 | 28,606.75 | 17,159.50 |
| 3 | 1999 EC | 41,872.81 | 1,314,173.86 | 1,354,758.70 | 30,651 | 19,470.30 |
| 4 | 2000 EC | 41,874.30 | 1,513,630.25 | 1,486,873.60 | 31,335.50 | 21,447 |
| 5 | 2001 EC | 4,874.30 | 1,807,676.30 | 1,616,421.70 | 39,220 | 21,276.50 |
| 6 | 2002 EC | 41,875 | 1,794,357 | 1,237,368 | 25,363.50 | 20,549.50 |
| 7 | 2003 EC | 41,875 | 2,289,848 | 1,895,461.90 | 45,641.50 | 29,112 |
| 8 | 2004 EC | 48,803.30 | 2,541,017.60 | 2,072,663.30 | 47,662.50 | 32,894 |
| 9 | 2005 EC | 48,803.30 | 2,546,946.40 | 2,201,616.70 | 42,475 | 31,010 |
| 10 | 2006 EC | 48,803.30 | 2,670,690 | 2,383,355.60 | 49,916 | 33,268 |

**Source: MSDARDB(2014)**

From the above table we can understand the fact that production of crops over the last ten years has shown a sharp increases and this is basically due to the increase in the awareness of modern technology such as: fertilizers and improved seeds.

**Table 13: Shows productivity of vegetables and root plants in 2006 EC**

| No | Name of vegetables and root plants | Area used in hector | Amount of production in hector |
|---|---|---|---|
| 1 | Chili | 52 | 1926 |
| 2 | Coli flower | 5.358 | 1148 |
| 3 | Tomato | 25.1 | 4,844 |
| 4 | Onion | 4706 | 1,039,829 |
| 5 | Garlic | 438.9 | 27,474 |
| 6 | carrot | 5 | 930 |
| 7 | Beat root | 5.5 | 1132 |
| 8 | Potato | 10.99 | 1587 |

**Source:** MSDARDB(2014)

**Figure 12: picture showing row planting adoption in the wereda**

Source: (author )

According to the data acquired from FGD most of the respondents suggested that the house hold size of the respondents significantly affects the respondents' adoptability to row planting technology. Since teff row planting technology in the current situation is labor intensive method of production as it can be seen on figure 5, households with large family size were able to provide more number of labor assistance from the family members.

**Figure 13 Teff Row seeder machine introduced by Ethiopian Institute of Agricultural Research (EIAR)**

Source**:** MSDARDB(2014)

As it can be seen on figure 13, due to its physical nature of the machine respondents with fragmented and small parcels of landholdings could not adopt this machine therefore it was very difficult to apply row planting technology of the purpose of teff production because of mechanization problem.

**Table 14: shows types and amount of fertilizers used in the last 5 years in quintal.**

| Years | Types of fertilizers used | | | |
|---|---|---|---|---|
| | **Urea** | **Dap** | **NPS** | **Total** |
| 2002 EC | 1,704 | 2,044 | 1,318 | 5,066 |
| 2003 EC | 2,054 | 3,011.20 | 1,473.10 | 6,538.30 |
| 2004 EC | 2,274.60 | 2,917.70 | 1,575.60 | 6,767.90 |
| 2005 EC | 3117 | 3,536 | 2,067 | 8,720 |
| 2006 EC | 32,231 | 38,231 | 21,907 | 72,659 |

**Source:** MSDARDB(2014)

**Table 15: Crop productivity in the two sample Kebeles**

| | Cherecha Kebele | Dire Dire |
|---|---|---|
| Climatic condition and crop productivity | It has cooler temperature and better rainfall. So, it leads to a better crop productivity | It has hotter temperature and very law rainfall. Therefore, there is a repeated drought as a result it leads to law crop productivity. |
| Cultivation of the land | The land is cultivated repeatedly because of available rainfall. As a result, it enhances crop productivity. | The land is not repeatedly cultivated because of there is chronic shortage of rainfall. As a result, it became another factor for law crop productivity. |
| Application of modern technology | The people who are living here are welcoming for modern agricultural inputs and technologies such as application of modern fertilizers, improved seeds, pesticides, row planting and so on. | Here most people do not have knowhow for the application of modern agricultural inputs and technologies like modern fertilizers, improved seeds, pesticides, row planting and so on. |
| Cultivated area per household | They don't have vast agricultural land to be cultivated per household. | They have vast area to be cultivated. But, their land management system is relatively inefficient. |

**Source:** MSDARDB(2014)

## 5.4 Diversity of livelihoods

According to the Central Statistics Agency (CSA) of Ethiopia (2007) census report on Amhara region, the total population of MSW is 128,879. The number of rural dwellers of the study area is 116,642, which holds the largest portion of the total population of the whole area. As a result of this the livelihood of the largest number of households in the area depends on the agricultural activities which accounts about 93.72 % (Table 164) of the total number of household in the study area. A very small number of the total population of the area depend on other non-agricultural activities like trade, handcraft and daily laborer the portion of house hold engaged in these are 3.9%, 1.16 % and 0.60 %. While the rest 0.60 % of the total house hold depend on other socio-economic activities.

**Table 16: Household economic activities engagement of minjar-shenkora wereda**

| No | Economic activities | Number of household | Percentage of household |
|---|---|---|---|
| 1 | Agriculture | 31505.85 | 93.72% |
| 2 | Trade | 1311.063 | 3.90% |
| 3 | Handcraft | 389.957 | 1.16% |
| 4 | Daily laborer | 205.0637 | 0.61% |
| 5 | Other | 205.0637 | 0.61% |
| | Total | 33617 | 100% |

**Source:** CSA, 2002 EC

## 5.5. Indigenous and Modern Soil and Water Conservation Practices.

According to MSDARDB Minjar Shenkora district has different soil types suitable to harvest various kinds of grains. The most dominant soil type in the study area is brown soil its coverage in the woreda (district) is about 46.5% of the total area. Even though their area coverage is very low there are also other types of soils, these are gray soil, black soil and red soil possessing the share of the total area 19.5%, 19% and 15% respectively.

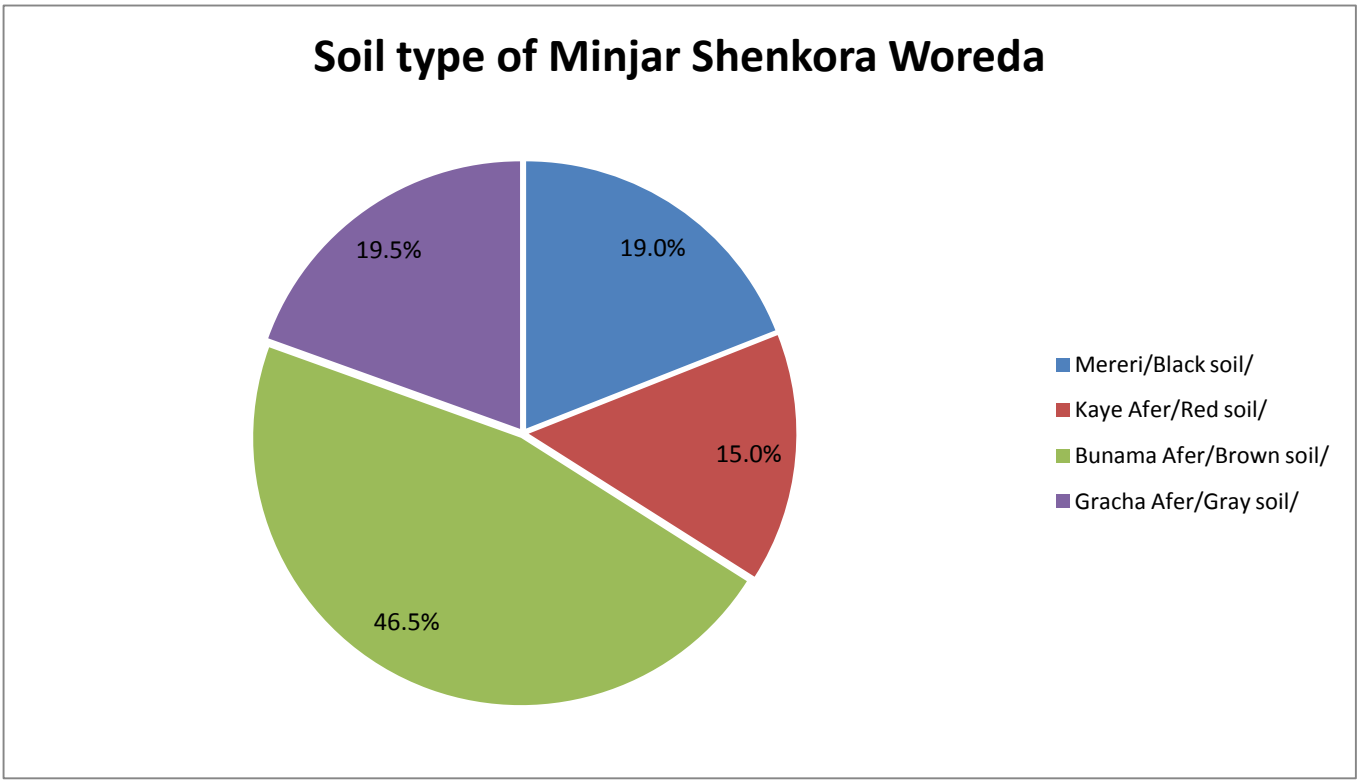


Figure 14: Soil type of Minjar-Shenkora Wereda Management Office

**Source:** MSDARDB(2014)

**Table 17: Farmers' Rating of Soil Fertility by Agro-ecological Zone, minjar-Shenkora wereda**

| Type of Soil Fertility | Agro-Ecological Zones | | | | Total | |
|---|---|---|---|---|---|---|
| | Dire Kebele (kola area) | | Cherecha Kebele (woinadega area) | | | |
| | No | % | No | % | No | % |
| Very fertile | - | - | - | - | - | - |
| Fertile | 3 | 9.1 | 16 | 17.2 | 22 | 12.2 |
| Moderately fertile | 8 | 24.2 | 11 | 11.8 | 20 | 11.1 |
| Infertile | 22 | 66.7 | Rate of soil fertility | 71.0 | 138 | 76.7 |
| Total | 33 | 100.0 | 93 | 100.0 | 180 | 100.0 |

**Source:** MSDARDB(2014)

**Table 18: Land husbandry system in the two sample kebeles**

| | **Cherecha (Woinadega Area)** | **Dire (Kola Area)** |
|---|---|---|
| Forest conservation | In this Kebele there is a better forest resource. So, the conservation culture is better here. | There is no forest resource here. Therefore, there is no conservation culture. Rather they cut down trees to generate additional income by making charcoal. |
| Soil conservation | There is a very good soil conservation culture by applying the following mechanisms like:<br>• Planting trees<br>• Terracing<br>• Gabion | There is very law soil conservation culture because of the fact that the soil in this area is not subject to erosion. Because their land is flat and very law and irregular rainfall type. |
| Soil fertility | The fertility of the soil is lower here and that is why the people here apply different types of modern agricultural inputs and modern technologies. | In here though the fertility of the soil is better, it is not productive. Because of very low amount of moisture in the soil. |
| Rehabilitation of mountain areas | Now a day, there is a huge activity of rehabilitating and planting trees in the mountain areas. | No mountainous area at all. |
| Irrigation scheme | There is a better condition of applying irrigation schemes because in this area there is a river locally called “Shenkora Wonz”. | There is no irrigation schemes because there is no river at all. |
| Overgrazing area | Almost no places are found overgrazed since animals are kept in the enclosure. | There are places which are overgrazed in different areas of the Kebele. |

**Source:** MSDARDB(2014)

### 5.6 Challenges of Small Farming

Soil erosion and land degradation are the two most major problems of agricultural activities in Ethiopia. During my study time in Minjar Shenkora district, I have observed some degradation and soil erosion problems. The picture below shows soil erosion problems locally called “Borobor” in Cherecha Kebele.

Figure 15: Gully caused by land degradation within the study area

Source: (author).

Now a day’s soil erosion and land degradation problem is carefully handled by the woreda agricultural management office. One of the measures taken to prevent soil erosion and land degradation problems is applying Gabion. I found such work in few places where the mentioned problems persists.

Figure 16: Use of Gabion for rehabilitation of degraded land within the study area

source: ( author)

Another measure which is being taken to overcome soil erosion in hill and mountainous areas is reforestation program. According to the information from the local farmers, of Cherecha Kebele, during the time of heavy rainfall there used to be high amount of erosion from the hill areas. But now such areas are being recovered from erosion related problems and during my observation time I have observed that there is a huge activity of reforestation.

The following picture shows the when some local farmers taking over their duty of reforestation program during their turn.

**Figure 17: Members of the study area community trying rehabilitation of degraded area in their locality**

**Source: (author).**

# CHAPTER SIX

## *6. CONCLUSION AND RECOMMENDATION*

### 6.1. Conclusion

This study comprises the livelihood bases and challenges of small farming

**Population Dynamics:** This study shows that the number of rural dwellers of the study area are 116,642, which holds the largest portion of the total population of the whole area. As a result the largest portion of the households in the area depends on the agricultural activities. The population growth of the wereda in the past 10 to 20 years has affected the land holding size.

**Asset Ownership:** This study has shown that land and animals are the major assets of the population. Land holdings have been reduced markedly over the last three decades due to large family size. The individual holdings between 1992 and 2001 show continuously decline.

**Livelihood Diversity:** Since agriculture is the major economic activity in the wereda the main grains produced are teff, wheat, barely maize, beans, lentil and few others. More than 93% of the wereda population engaged in agricultural activities and only about 4% of the population who are engaged in noon- agricultural activities.

**Land husbandry system:** Land is the key resource for life and this key resource has to be managed in a sustainable manner. In my study area there are many places that have been affected by land degradation activities. During my field observation I have observed many places which are now being under huge conservation and rehabilitation work by the local community , such as: planting trees and gabion .

**Soil type:** The major types of soils in the study area are black and brown soils with Swelling characteristics in the case of exposure to small amount of rain due to this reason teff seeds planted through broadcasting method has no any depth in to the ground therefore it easily lifted up and due to openings and passages created beneath the surface resulted in the exposure of seeds to air, consequently the teff seeds will dried up and crack then this affect germination of the seed. In order to avoid these problems the local farmers applied very high seed rate in both planting methods.

**Extension service: a**dopters of row planting technology had better access to trainings, compared to non-adopters, on application of plastic bottle row seeder, application of reduced seed rate, appropriate width and depth of seeding, row planting and transplanting by DAs, this result in a significant difference in the application of teff row planting technology. Most of the trainings were provided mainly through oral orientation of DAs in the FTC not through the farmers' direct Practical participation in demonstration centers. At the same time the frequency of extension service provided by DAs to adopters of the row planting technology is higher than that was provided to the non-adopters. Farmers are not supported with any safety net programmers to minimize risk adoption of row planting.

## 6.2. Recommendation

Even though, it is difficult to draw sound policy recommendations from an empirical study based on limited data covering only one woreda and production year, however, some observations can be made to guide future research studies. In regard to this, based on the observations made from the study the following recommendations can be forwarded:

Results of this study signify that adoption of at least one or more type of modern agricultural technologies, notably application of fertilizer with improved wheat and improved teff seeds and herbicides gives promising wheat and teff grain yields of 20 qt/ha and 16 qt/ha, respectively. Therefore, it is necessary to encourage small farm households to apply at least one of these modern agricultural inputs, which are in fact more suitable, so as to increase grain productivities in the short run.

In the case of animal husbandry , even thought the woreda has large number of cattle population but the husbandry system is still at its infant stage. If the government and policy makers provide the society with the necessary support such as: trainings, veterinary services and so on, it will be more productive.

Furthermore, there were positive and significant correlation between educational attainment of household head and access to credit use and adoption and crop productivities in the woreda. Hence, strengthening and expanding education and rural finance services were vital in order to change or improve the knowledge of modern agricultural technologies and facilitate the accessibility and use of credit by small farm households.

Further studies need to explore the impact of variables like; distance to the market center, condition of soil fertility, condition of land tenure, condition of credit use, condition of rainfall distribution, availability of labor supply and ratio of price of farm output and cost of inputs on households adoption decision and grain productivities using more advanced quantitative techniques.

Those modern agricultural inputs are/were introduced into the woreda coming from geographical areas which may or may not suitable for a particular area hence it needs more research on through involvement of the farm household in technology generation and dissemination in order to use the technologies sustainable.

Generally, since most of the agricultural production comes from the small holders farm households and small farm households make up the largest segment of the rural population, promoting small farm households adoption of modern agricultural inputs in sustainable condition would bring the greatest overall benefits in terms increasing the livelihood bases in the wereda.

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# APPENDICES

## *Annex A: Checklists Designed for Agricultural Extension Workers*

The aim of this questionnaire is to investigate the basic problems on the adoption of modern agricultural technologies (inputs) in Minjar-shenkora woreda. Therefore, you are kindly requested to give appropriate answers.

Thank you in advance for your cooperation

Respondents ID _____

Age _____

Sex _____

Level of Education_____

Agro-climatic zone_____

Peasant association_____

Interviewer's Name_____

1. When did the agricultural extension service started and what function was/ were given in the woreda?
2. What factors determine the extension service in regard to modern agricultural technology (inputs) adoption in the woreda?
3. How many demonstration plots or FTCs are there in the woreda?
4. How many development agents do you have in your station?

5 Have you take further training to upgrade your knowledge like in service training?

Yes ☐ No ☐

6. What are the factors that impede the level of adoption of modern agricultural technologies (inputs) in the woreda?

7. What is the condition of small farm household's use of complementary modern agricultural technologies (inputs) like fertilizer with improved variety of seeds?

8. Do you believe that the existing numbers of DAs are sufficient for advising and persuading the farm households in order to use modern agricultural inputs?

9. What is the extent of agricultural input adoption? Which agricultural inputs are more preferred by the farm household and why?

10. What were the conditions of rainfall distribution during the 2000 E.C. cropping season?

11. What are the conditions of teff and wheat productivities under the use of modern agricultural inputs? What about the productivities of these crops without the use of modern farm inputs?

### *Annex B: Checklists Designed for Focus Group Discussions*

The aim of this group discussion is to investigate the basic problems on adoption of modern agricultural technologies (inputs) and crop productivity in Minjar-shenkora wereda. In regard to this, members of the discussant were selected from each sample PA with the help of peasant association administrators and DAs. The members of the discussant are 20. It is on the basis that you are representing your peasant association. Therefore, you are kindly requested to discuss each issue freely and frankly.

1. Condition of land tenure security with regard to entitlement of land ownership.
2. The condition of land holding since starting farming with reference to crop productivity and size of land holding.
3. Use of modern agricultural technologies like fertilizer, improved seeds and herbicides during the last two years. Which agricultural technologies are more preferred and why?
4. The conditions of price of farm output and cost of inputs. Fertilizers, improved teff and wheat seeds and herbicide
5. The conditions of institutions like input delivery, credit, market and extension services.
6. Agro climatic zone of the area comparing with the past five years.
7. Conditions of animal manure use during the last two years.
8. What are the conditions of crop productivities using one or more modern agricultural inputs? What about with local farm technologies?

# DECLARATION

I, the undersigned, have taken all the important comments and criticisms during my defense from the examiners and take huge corrections on my thesis. Therefore I declare that the thesis is my original work, that has not been presented for a degree in any other university and that all sources of material used for the thesis have been duly acknowledged.

Declared by:

Name Aweke Fekade

Signature _____

Date _____

This thesis has been submitted for examiners with approval as a university advisor.

Name: Yohannes G/Michael (PhD)

Signature _____

Date_____