

**St. MARY'S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**Institute of Agriculture and Development Studies**



**DETERMINANTS OF FOOD SECURITY IN THE  
RURAL HOUSEHOLDS OF MESKAN WOREDA,  
GURAGE ZONE, SNNPR, ETHIOPIA**

**By**

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**JUNE, 2014**

**ADDIS ABABA, ETHIOPIA**

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**ID NO- MARD/0195/2005**

**A THESIS SUBMITTED TO ST. MARY'S UNIVERSITY, SCHOOL OF  
GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS IN RURAL  
DEVELOPMENT**

**JUNE, 2014**

**ADDIS ABABA, ETHIOPIA**

**St. MARY'S UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
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## DECLARATION

I, the undersigned, declare that this thesis is my original work, prepared under the guidance of Dr. Abate Bekele. All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

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## **ENDORSEMENT**

This thesis has been submitted to St. Mary's University, School of Graduate Studies for examination with my approval as a university advisor.

Dr. Abate Bekele  
Advisor

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Signature and Date

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## ACKNOWLEDGEMENTS

First of all I would like to praise my heavenly father God and His Mother, St. Mary's, for Their guidance and support throughout my life. Without their unreserved mercy, I wouldn't be now. My deepest gratitude goes to my advisor Dr Abate Bekele for his always well-come face, warmest initiation and constructive comments throughout the study period. Well, I don't have enough words to express my appreciation to him. Had it not been with the help of Meskan Woreda Agricultural Office, especially the enumerators (Ketema Teme, Awel Usman and Adane Keti) and the supervisor (Abayneh Sija) for collecting the data and giving relevant information to strengthen my study, this paper wouldn't have been really successful. So my deepest respect and appreciation goes to them.

I would like to acknowledge the Saint Mary's University for understanding me, especially Dr Elias. My best friend and at the same time my brother, Wondesen Misganaw, has also done a lot for me. So I thank him from the bottom of my heart. My special thanks go to Gerbreyesus Werede (Yared) for his always advice and technical support to me.

Moreover, my gratitude will goes to Ato Mesafint Gizaw his moral initiation to start this study. My friends who is working with me, especially Abinet Tsegaye, for their understanding and coverage of my work position when I was busy on my study. So words are not easy to express my deepest gratitude to them. The last, but not the least thanks go to my beloved families for their patience, unreserved love and technical support.



## **LIST OF ABBREVIATIONS**

ADLI- Agriculture Development Led Industrialization

AE- Adult Equivalence

DAP- Diammonium Phosphate

DFID- Department for International Development

DPPC- Disaster Prevention and Preparedness Commission

EFSS- Ethiopian Food Security Strategy

FAO- Food and Agricultural Organization

FDRE- Federal Democratic Republic of Ethiopia

GDP- Growth Domestic Product

IFAD- International Fund for Agricultural Development

Kcal- Kilocalorie

MDG- Millennium Development Goal

OECD- Organization for Economic Co-operation and Development

PSNP- Productive Safety Net Program

SNNPR- Southern Nations Nationalities and People's Region

SSA- Sub Saharan Africa

TLU – Tropical Livestock Unit

USAID- United States Agency for International Development

WB – World Bank

WFS- World Food Summit

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## **ABSTRACT**

The study was conducted has the main objective of identifying the major factors that influence food insecurity in the rural households of Meskan Woreda, Gurage Zone, SNNPR State, Ethiopia which was held from February, 2014 to May, 2014. In order to achieve this objective, demographic and socio-economic data were collected from 120 randomly selected farm households in the selected three Kebeles of Meskan Woreda namely Beresa, Dubo Tuto and Semen Shereshera. A purposive sampling method was employed to select the sampling units. A survey was conducted to collect the primary data from the sampled farmers in the study areas through administering a structured questionnaire to rural households to gather qualitative and quantitative data pertaining to household demographic characteristics and related issues about the farm household in a specific period. And also a secondary data from various sources and personal observation were conducted. Both the descriptive and econometric methods of analysis were employed to analyze the collected data. A household total expenditure per adult equivalence was used to assess the current status of household food insecurity. In order to investigate the effect of each predictor variable on the household food security status a bivariate analysis was performed. Among the econometric method of analysis a logistic regression model was fitted to analyze the potential variables affecting household food insecurity in the study area. The descriptive analysis result revealed that about 102 (84.91%) of the households were found to be food insecure while 18 (15.01%) were food secure. Moreover, the logistic regression model estimate correctly predicted (84%) of the sample cases, (88.9%) food secure and (96.4%) food insecure. Among the 10 variables included in the logistic model, 8 of them were significant at less than 10% probability level. These are age of the households head, family size, number of livestock owned, number of oxen, farm land size, use of fertilizer, off-farm income per adult equivalence and farm credit. On the other hand, limiting size and frequency of food, borrowing and gifts from relatives and friends, selling of livestock, selling of firewood, off-farm income, cash for work and relief assistance as the main coping strategies practiced in the study area. Finally, limiting population size, promoting and expanding off-farm income generating schemes, improving the livestock production and productivity, access to credit and agricultural inputs like chemical fertilizer and improved seeds with market functioning were recommended.

Key words: Determinants, Food insecurity, Coping Strategy, Meskan Woreda, SNNPR, Ethiopia.

# CHAPTER ONE

## INTRODUCTION

### 1.1. Background

Enough food in terms of quantity and quality for all people is an important factor for a nation to continue its development. Lack of food in long terms will lead to hunger and starvation that can cause death. So that enough food is a necessity condition to be well nourished. In today's world food insecurity, malnutrition and hunger would remain the main agenda and much more serious problems (Sila and Pellokila, 2007).

However, there are 1.4 billion poor people living on less than US\$1.25 a day. One billion of them live in rural areas where agriculture is their main source of livelihood, especially sub-Saharan Africa and Southern Asia (UN, 2011; IFAD, 2011a). Approximately, 2.5 billion people of the world's live directly from agricultural production systems, either as full- or part-time farmers, or as members of farming households that support farming activities (FAO, 2008a). Despite their importance in global and regional food production, smallholder farmers comprise the majority of the world's undernourished population and most of those living in absolute poverty (UN Millennium Project 2005a; IFAD, 2011a).

About 842 million people in the world remain food insecure, with many more suffering from 'hidden hunger' caused by micronutrient or protein deficiencies, and where about 205 million children are malnourished. While food insecurity occurs in most countries to varying degrees, 75% of the food insecure people live in the rural parts of the developing countries, in which two-thirds of these live in just seven countries (Bangladesh, China, Democratic Republic of Congo, Ethiopia, India, Indonesia and Pakistan) (Graham *et al.*, 2007 pp 23; Keatinge *et al.*, 2011; FAO 2011a; Khush *et al.*, 2012).

Throughout most of sub-Saharan Africa (SSA), there is food deficient. Frequent droughts, growing expenditure on food production and imports, falling export earning and rapid population growth have been cutting into living standards and growth prospects. The effect have been pervasive, not only on incomes of agricultural producers, who include most of Africa's poor, but also on supplies of food and raw materials for industry, on employment, savings, government

revenue, and on the demand for goods and services produced outside agriculture. Yet policy changes and planning for resumption of growth in agriculture are hampered by a serious lack of country-specific information. Reform efforts all too often try to apply general remedies to Africa's diverse problems. In all the SSA countries, population growth has put intensive pressure on agricultural land and the size of land holding is inadequate to produce enough food for the whole family. As a result, population pressure has brought increasingly marginal land into cultivation, which possibly affects statistics on average yield per hectare. The need to increase land and labor is becoming urgent (Khush *et al.*, 2012).

Despite, Sub-Saharan Africa (SSA) is a region where with the highest incidence of food insecurity in the world (Devruex, 2006), Ethiopia is among the poorest and most food insecure countries of the world, where 26% of the population live below the poverty line (FDRE, 2013) and many people died of drought than other problems particularly in the periods of the registered and documented recurrent drought epidemics. The country has been facing challenging problems ranging from those induced by environmental crisis to those caused by demographic and socioeconomic constraints that adversely affect people's production system (World Bank, 2008).

To reverse the dire food insecurity situation of small-scale rural farmers, the Ethiopian government formulated a long-term strategy—the agricultural development-led industrialization strategy (ADLI)—which takes agriculture as its point of departure and as the growth engine (Alemu *et al.*, 2002).

A food security strategy is the major component of the ADLI policy. The first version of the food security strategy was issued in 1996 and was revised in 2002 and 2005, highlighting the government's plan to address causality and the effects of the food security problem in the country. In general, the objective of EFSS (Ethiopia Food Security Strategy) is to ensure food security at the household level. To ensure sustainable food security in the country, rural development policies and strategies were also formulated. The rural development policy envisages that development and food security would be ensured through agriculture-led and rural-centered development. The policy emphasized targeted interventions for drought-prone and food insecure areas, such as Meskan Wereda, which are characterized by erratic rainfall,

vulnerability, soil degradation, low per capita and high population pressure (Food Security Program Proposal/FSPP, 2003). The strategy envisaged developing an agricultural-based economy by raising the production and income of farmers. It was implemented in all food insecure districts of Ethiopia. It is a vital development tool for achieving the Millennium Development Goals (MDG), one of which is to halve by 2015 the share of people suffering from extreme poverty and hunger (World Bank, 2008).

According to the 2010 DPPC half year report on SNNPR food security situation, the Southern Nations, Nationalities and People's Regional State (SNNPR) where the study area is located is one of the food insecure regions in Ethiopia. The report also revealed that the food insecure in rural areas of the region includes the following vulnerable groups: landless and the poor without assets, very small and fragmented land holders, female-headed households, families with large size, dislocated pastoral members, drought and pest affected households.

According to Meskan Woreda Agricultural Office, Meskan Woreda is believed to be one of the chronically and seasonally food insecure areas of the SNNP Region. In Meskan Woreda, 24 food insecure kebeles are by now using Productive Safety Net Program (PSNP- Annex 3). The total production is persistently inadequate to cover food requirement of the population. This is mainly due to high population growth, erratic climatic condition, unimpeded environmental degradation, poorly developed infrastructure and the recurrent drought. Due to such reasons, it has long been a food deficit Woreda with widespread and deepening seasonal food insecurity situation.

The main reasons for selecting Meskan Woreda as the area of the study are: (a) rural farmers in this Woreda are exposed to a number of natural and man-made disasters. As a result, they are repeatedly prone to seasonal food insecurity, (b) Meskan Woreda is labeled as typical food insecure area despite various food and nutrition security interventions made by the government and non-government organizations.



## **1.2. Statement of the problem**

In Ethiopia, food shortage has aggravated the already poor economy of the country and it varies from one area to another depending on the state of the natural resources and the extent of development of these resources. Both chronic and transitory problems of food insecurity are widespread and severe mainly in the rural areas of the country. The reasons are mainly due to environmental and human factors (Webb *et al.*, 1992).

In Ethiopia, the number of chronically food insecure population is slightly more than eight million. Hence, the country needs immense and all round efforts to totally eliminate chronic and transient food insecurity. Accordingly, it has been undertaking different actions. However, the typical response to food insecurity in Ethiopia, prior to the start of the PSNP, was emergency food relief resourced through an unpredictable annual appeal process. While there was no doubt that this relief saved many lives, it did not halt the increasing numbers of food insecure people (Abebaw, 2010). According to Meskan Woreda Agricultural and Rural Development Office (2010), Meskan Woreda was one of the 79 Woredas which were defined as chronically food insecure in SNNPR. Like other Woredas, the programme started in 2005 by targeting 6,456 households. But currently, the number of beneficiary households increased to 19,024 within the 24 kebeles of Meskan Woreda (Please look at Annex 4).

The main economic base of the study Woreda lies on a subsistence rain fed agriculture, with high variability in occurrence, spatial and temporal distribution of rainfall. Even under normal times, agricultural production often fails to sustain life for a prolonged period throughout the year. Farm management system in the Woreda generally follows traditional method and the role of irrigation is very limited and hence, agriculture is dependent on rain- fed farming. Meskan Woreda generally faces acute shortage of food approximating semi- starvation for most households lasting about 8 months within a time span of one year.

As noted by Degefa (2005), not only the amount of rainfall, but also the quality of land affects the type and amount of crop that a household harvests. Because with a shortage of rainfall and declined soil fertility, intercropping main crops with cash crops is becoming difficult. This, in turn, affects household's level of food security.

The major aggravating factors of food insecurity in the study Kebeles (Beres, Dobo Tuto and Semen Shershera) are shortage of rain and erratic nature of rainfall distribution which leads to heavy soil erosion during rainy seasons. These are the major phenomena which led to asset depletion of many rural households in the study area.

Per capita growth of production of major food items in the study area are not sufficient to satisfy the demand of an increasing population. Rate of population growth is increasing due to cultural practices (polygamy), lack of knowledge on family planning services on the part of the household head, limited health related service providers and socio-cultural influence. Although the seriousness of food shortage varied from year to year, farm households faced seasonal food shortage almost every year. This implies the existence of structural, socio-economic, cultural, demographic and other factors underlying the poverty and seasonal food insecurity problem in the study area.

### **1.3. Research questions**

The research questions are the following:-

- i. What is the current status of food insecurity problem in the rural households of the study Woreda?
- ii. What are the most important factors that influence food insecurity of the rural households in the study Woreda?
- iii. What are the proportional/ apparent relationship between food insecurity and its determinants?
- iv. How are the coping strategies pursued by the households against the risks of food shortage?

#### **1.4. Research objectives**

The general objective of the study is to identify major factors influencing food insecurity in the rural households of Meskan Woreda, Gurage Zone, SNNPR in Ethiopia.

The specific objectives of the study are:

- i. To assess the current status of food insecurity in the rural households of Meskan Woreda;
- ii. To examine the effects of some variables that may influence food insecurity of rural households and identify the most important determinants;
- iii. To describe the proportional/ apparent relationship between food insecurity and its determinants; and
- iv. To explore the diverse coping mechanisms pursued by the rural households in the study Woreda.

#### **1.5. Significance of the study**

Identifying and understanding major factors that cause and/ or influence the problem as well as its coping strategies at household level deserves rigorous empirical research where food shortage has been pronounced and has great importance for policy implications and interventions.

It is imperative to describe and diagnose the existing farming systems to provide policy related information that helps to prioritize among the many possibilities depending on the relative extent of influences of its determinants. More specifically, the results of the study help concerned bodies formulate policies and develop intervention mechanisms that are tailored to the specific need of the study area. In the end, the study will contribute to further research, extension and development schemes. .

## **1.6. Scope and Limitations of the study**

The study focused on identifying major factors that are expected to influence household food insecurity and the coping strategies with limited number of households in the rural parts of Meskan Woreda. The study covered only three Kebeles namely Beresa, Dubo Tuto and Semen Shershera. Out of the three kebeles of Meskan Woreda, from which 120 households were selected.

Due to financial and time limitations, the study didn't focus on a comparative analysis of food insecurity problem between urban and rural Kebeles. Despite the limited sample size and area, the study was concerned about transitory food insecurity faced by farm household for any magnitude ranging from mild to severe and hence doesn't deal with causes of chronic food insecurity.

The major challenges the researcher faced were lack of financial support and willingness of the respondents to give the appropriate responses to the questions during data collection. Despite all these challenges, the researcher did his level best to capture reliable information explaining the purpose of the study and the benefits it contributes to their well-being.

## **1.7. Organization of the paper**

This paper is organized into six chapters. The first chapter comprises the introduction of the research consisting of the background of the study, statement of the problem, research questions, research objectives of the paper, significance, definition of terms, scope and limitations of the paper. The second chapter deals with literatures reviewed from various sources. The third chapter provides about the research methodology with background information about the Woreda and the study Kebeles, the type of research design used the sampling techniques, the data collection methods and also data analysis. Chapter four consists of the major research findings and discussions and the paper winds up by presenting summary, conclusion and recommendations in chapter five.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1. Introduction**

In this chapter, literature that is relevant and available on the subject of the study is reviewed. Various concepts and approaches to food security and factors that could influence food security are discussed in detail. Different views on food security are discussed briefly. Problems faced by communities in developing countries are highlighted. For the purpose of the study, it was necessary to obtain an overview regarding these three contexts and how food security manifests itself on the three levels. The chapter ends with concluding remarks.

#### **2.2. Concepts and definitions of food security**

Food is both a need and a human right, but food insecurity is prevalent in today's world in general, and in sub-Saharan Africa in particular (GAO, 2011). Until the mid 1970's, food security was understood as adequacy of food supply at global and national levels. This view favored merely food production oriented variables and overlooked the multiple forces which in many ways affect food access. Evidences show that during the last two decades, food production has been increasing in the world. However, large amount of food at global level does not guarantee food security at national level. Moreover, availability of enough food at national level does not necessarily ensure household food security. For instance, in 1990, the calorie supply at global level was more than 110 percent compared to the total requirement. However, during the same period, more than 100 million people were affected by famine and more than a quarter of the world's population was short of enough food (UNDP, 1992 cited in Tsegaye, 2009). Although food production has been increasing from time to time, food insecurity, malnutrition and hunger and much more serious problems would remain the main agenda in the globe today (Barrett, 2002).

In the early 1980s, however, a paradigm shift occurred in the field of food security following Sen's (1981) claims that food insecurity is more of a demand concern affecting the poor access to food than a supply concern, which in turn, affecting availability of food at the national level. Since then, accepted wisdom has defined food insecurity as being primarily a problem of access to food. At the same time, the unit of analysis shifted from the global and national level to the

household and individual level. Overtime a large number of different definitions have been proposed. A report by Maxwell and Frankenberger (1992) lists 194 different studies on the concepts and definition of food security and 172 studies on indicators. There are approximately 200 definitions and 450 indicators of food security (Hoddinott, 1999 cited in Alemu, 2007).

The conceptual framework of food security has also progressively developed and expanded with occurrence of hunger, famine, and malnutrition are increasing from time to time in developing countries. As noted by Debebe and Tesfaye (1995), the idea of food security attained wider attention since the 1980s after the debate on ‘*access*’ to food and the focus of the unit shifted from global and national levels to household and individual levels. This paradigm came with new concept and definition of food security and it led to two additional major shifts in thinking; from a first food approach to a livelihood perspective and from objective indicators to subjective perceptions (Maxwell *et al.*, 1994).

The most commonly accepted definition of Food security is “*access by all people at all times to enough food for an active and healthy life*” (World Bank, 1986). Food insecurity is a *situation in which individuals have neither physical nor economical access to the nourishment they need*. A household is said to be food insecure, when its consumption falls to less than 80% of the daily minimum recommended allowance of caloric intake for an individual to be active and healthy. In particular, food insecurity includes low food intake, variable access to food, and vulnerability- a livelihood strategy that generates adequate food in good times, but it is not resilient against shocks. These outcomes correspond broadly to chronic, cyclical, and transitory food insecurity, and all are endemic in Ethiopia (Devereux, 2000).

During the debates that preceded the World Food Summit (WFS) held in Rome in 1996, it was established that “*There is food security when all people at all times have sufficient physical and economic access to safe and nutritious food to meet their dietary needs including food preferences, in order to live a healthy and active life*”(USAID, 2008). Although there were agreements on some aspects of food security, controversies also existed. When an individual or population lacks or is potentially vulnerable due to the absence of one or more factors outlined above, then it suffers from or is at risk of food insecurity. Based on the WFS (1996), the

definition focuses on three distinct but interrelated elements, all three of which are essential to achieving food security: these are food availability, food access and food utilization.

**Food Availability** refers to the physical presence of food which may come from own production, purchases from internal market or import from overseas.

**Food Access** refers to the ability to obtain sufficient food of guaranteed quality and quantity to meet nutritional requirements of all household members.

**Food Utilization** refers to ingestion and digestion of adequate and quality food for maintenance of good health.

According to Hoddinott (1999), the concept of food security also has spatial and temporal dimensions. The spatial dimension refers to the degree of aggregation at which food security is being considered. It is possible to analyze food security at the global, continental, national, sub-national, village, household or individual level.

The temporal dimension refers to the time frame over which food security is being considered. In much of the food security literature, temporal dimension is almost universally classified into two states - chronic or transitory (Hoddinott, 1999; Tweeten, 1997; Devereux, 2006). **Chronic food insecurity** is a long-term or persistent inability to meet minimum food consumption requirements; while **transitory food insecurity** is a short-term or temporary food deficiency. An intermediate category is **cyclical food insecurity**, such as seasonality. Transitory is often used to imply acute with the corollary assumption that chronic equates to mild or moderate food insecurity (Devereux, 2006).

Famine is the worst form of transitory food insecurity (Devereux, 2006). Hence, transitory food insecurity faced by farm households will be understood in this study as a seasonal food shortage of any magnitude ranging from mild to severe. It can also be noted that the concepts of transitory food insecurity and seasonal food shortages are synonymous and are used interchangeably in this study. As the Ethiopian farming system is mainly dependent on rain-fed agriculture, seasonality adversely affects the food security situation of the country.

### **2.3. Food security situation in Ethiopia**

Prior to 1950s, Ethiopia had been self-sufficient in staple food and classified as net food grain exporter, however, the average food production during the last three decades remained very low (Debebe, 1995).

The history of Ethiopia is highly linked with severe, recurring food shortage and famine. In much of the available literature, such problem is mainly associated with recurrent drought. Currently, there is growing consensus that the food insecurity and poverty problems are closely related in the Ethiopian situation. Between 1983 and 1993, Ethiopia witnessed three major droughts and a nationwide famine that claimed the life of a million people (Dessalegn, 1990). During the 1980s, both food production and per capita food availability had experienced a downward trend. Total domestic production on average decreased by 0.4 percent per annum, leaving behind an uninterrupted dependency on food aid (Adera , 1999 as cited in Dagnew, 2002).

As noted by Debebe (2005), in spite of significant political and economic reforms during the 1990s, some years of record harvest and increasing levels of assistance from the international donor community, Ethiopia remains to be one of the most food insecure countries in the world. For the past twenty years, according to the records of the DPPC, the number of beneficiaries in Ethiopia in need of annual food assistance has not fallen below two million people. During the 1990s, even after the subtraction of the population of Eritrea, the number of beneficiaries has not dropped below three million, despite bumper harvests in 1995 and 1996. In the year 2000, some eight million people were identified as needing relief assistance.

However, the years 1973-74, 1984-85, 1993-94 and 1999-2000 were drought years in the recent Ethiopian history. Especially some pastoral areas like Somali region and Borena in the Oromiya Region were badly affected during the 1999-2000 drought related crises. The origin of the crises goes back to 1998, when the *meher* rains ended early, damaging some of the long maturing crops traditionally grown during the same season. In addition, the *belg* (small rains) in 1999 failed completely in the *belg* crop growing areas of Tigray, Eastern Amhara and parts of SNNPR. In February 2004, FAO/ WFP estimated the total food production for 1999 at 10.72 million tons, a



reduction of six percent from the production in 1998 and inadequate to meet the country's needs (Christian Aid, 2000).

In Ethiopia, agriculture accounts about 42.5 percent of the total GDP, employing and supporting about 84 percent of the total population and accounts for about 90 percent of the exports (CIA, 2011). In spite of all this, it is increasingly evident that access to off-farm sources of income is critical to the survival of the rural poor (Jenden 1994; Creaswell, 2000). Peasant agriculture accounts for over 90 percent of the agricultural output, and is rainfall dependent. Not only the quantity, but also the timing of rainfall is of critical importance. The right amount of rain at the right time is far more important than the use of fertilizer, improved seeds, agrochemical or irrigation. Under the present condition, where farmers' incomes are so low and household assets, particularly livestock holdings, have been so depleted, an unfavorable seasonal rainfall can mean vulnerability or destitution for the rural households. It is often stated that Ethiopia can expect a major drought in at least the three years out of ten. This oversimplifies a much more complicated picture (Dagneu, 2002). The food insecurity situation of Ethiopia varies from place to place. Annex 9 shows the food insecurity situation of Ethiopia.

#### **2.4. Causes of food insecurity in other developing countries**

Causes of food insecurity facing farm households in various developing regions, particularly Africa, Latin America and Asia, have been documented in some literature. The difference lies in the magnitude of the problem in terms of its severity and proportion of the population affected.

The root cause of food insecurity in developing countries today is believed to be the inability of people to gain access to food due to poverty (Von Braun *et al.*, 1994). According to Mwanki (2005) study, some of the main causes of food insecurity in developing countries are unstable social and political environments that preclude sustainable economic growth, war and civil strife, macro-economic imbalances in trade, natural resource constraints, poor human resource base, gender inequality, inadequate education, poor health, natural disasters, such as floods and locust infestation, and the absence of good governance. All these factors contribute to either insufficient national food availability or insufficient access to food by households and

individuals. All factors, however, can be related in some fashion to two basic causes: insufficient national food availability and access to food by households and individuals.

Diseases and infections are identified as causes of food insecurity such as malaria, tuberculosis and mainly HIV/AIDS not only reduce the man hours available to agriculture and household food acquisition, but also increase the burden of household in acquiring food. Migration of male labor was also recognized as a cause of seasonal hunger in Lesotho (Alex, 2003 cited in Driba, 1995 and Degafa, 2002).

The type of food insecurity observed in sub-Saharan Africa is a combination of widespread chronic food insecurity, resulting from continuing or structural poverty, transitory emergency-related food insecurity, which occurs in periods of intensified pressure caused by natural disasters, economic collapse, or conflict (FAO, 2004).

However, 99% of the food in sub-Saharan Africa is grown under rain fed agriculture. Hence, food production is vulnerable to adverse weather conditions. The reason behind is that there was an over decline in farm input investment including fertilizers, seeds, and technology adoptions. Other causes include rapid population growth, limited access to agriculture-related technical assistance, underdeveloped agricultural sector and lack of knowledge about profitable soil fertility management practices leading to expansion in to less-favorable lands (Boussard *et al.* (2005). Barriers to market are also causes of food insecurity in Africa (Mwanki, 2005; FAO, 2005). As he mentioned some barriers of market access were poor infrastructure, market standards, limited information, and requirements for large initial capital investments, limited product differentiation, and handicapping policies.

## **2.5. Determinants of household food insecurity in Ethiopia**

The debate in Ethiopia over the causes and determinants of food insecurity has fuelled highly contested viewpoints between the academic disciplines and in development thinking in general over the past few decades, giving rise to a proliferation of natural, demographic, economic, and political emphases across the food security literature (Devereux, 2001; Shiferaw *et al.*, 2003).

Demographic characteristics such as the gender, age, and education of the household head were expected to influence food security positively (Shiferaw *et al.*, 2003). On the other hand, family size was expected to have a negative influence on food security (Muluken, 2005). Since most of the farm households are smallholder subsistence producers, an increase in the number of people in the household tends to exert more pressure on consumption than the labour it contributes (Shiferaw *et al.*, 2003).

Ownership of assets such as cultivated land and livestock were expected to affect the food security of the households in this study positively. According to Muluken (2005), food production is increased extensively through expansion of the area under cultivation, while livestock provides not only food for the producers but also other products which could be sold to provide food or income.

Fertilizer is used by most studies as a proxy for technology. According to Adane (2008), subsistence farming by its nature is production for direct consumption. Any farm input that augments agricultural productivity is expected to boost the overall production; this contributes towards attaining household food security (Shiferaw *et al.*, 2003). In the present study, fertilizer usage was expected to increase household food production and hence enhance food security.

Income plays a key role in a household's accessibility to food. It enables households to modernize their production by giving them an opportunity to buy the necessary inputs, and reduce the risk of food shortage during periods of unexpected crop failures through purchases. It was expected that the total annual income of the household and food security would be positively related (Muluken, 2005).

Access to extension and veterinary services was expected to have a positive impact on household food security in the study area. The availability of credit, another important variable, was expected to influence the household food security status positively. Households who have received credit had the possibility to fulfill their needs for food (Debebe, 1995).

Besides, availability and accessibility of foods are the main determinants that affect food security (Anderson, 2011). Non-food factors like education, health care and clean water, population growth, urbanization and displacement of people highly influence food security and human nutrition. According to this source, natural resources and agricultural inputs are critical determinants of food security.

## **2.6. Major factors affecting food security in Ethiopia**

Although investigations concerning farm households' food shortage have been limited, the situation in Ethiopia does not deviate much from the condition in other developing regions. In general, the following combination of factors has resulted in serious and growing problem of food insecurity in Ethiopia. Some of the major factors influencing food security are:

### **A. Demographic factors**

Rapid population growth leads to a demand for additional land and clearing of new areas for expansion of farmland and settlement. As per to FDRE (1996), the Ethiopian Food security strategy which was issued in 1996 stipulates that high population growth rate is one of the main impediments to ensure food security. Provision of effective education, health and other essential social and economic services may alleviate the problem (FDRE, 1996).

In support of the above statement Dagnew (2002) argues that rapid population growth among other factors is the cause for natural resource degradation which aggravates insecurity problems in rural households. In his study on seasonal food insecurity in Oromia Zone, Degefa (2002), also revealed that the rate of population growth which exceeds the rate of economic growth has resulted in small landholding, resource exploitation, and limited fallow period among the rural communities in Ethiopia.

At the micro level, household size is one of the factors expected to have influence on food security status of households. The majority of farm households in Ethiopia are small scale semi-subsistence producers with limited participation in non-agricultural activities since landholding size and financial capital to purchase agricultural inputs is very limited. Kidane (2005) in his

work found that family size tends to exert more pressure on consumption than the labor it contributes to production.

Another demographic factor that strongly influences household food security is sex of the household head. Studies by Degafa (2002), Ramarkrisha and Assefa (2002) and Kidane *et al.* (2005) independently conducted studies in different parts of rural Ethiopia and came out with common conclusion that the livelihood of female headed households was disadvantaged when compared to their male counterparts. This is due to the fact that, the researchers justify, female household heads have limited access to livelihood assets like land, education, saving, labor force and oxen (drought power), livestock and credit services.

## **B. Environmental factors**

Environmental factors include land, water, vegetation, soil, and climate upon which agricultural activities (crop production, livestock rearing, fishery, forestry, apiculture, horticulture and others activities) are based. Hence, any hazard against these resources can affect food security situation of a given community (Yared, 2001).

In explaining the effect of environmental changes on the livelihood of farmers in Ethiopia, Getachew (1995) argued that the traditional farming systems of the Ethiopian peasants consumes and exploits the natural resource base, therefore, resource degradation, depletion and environmental problems are inevitable. They also elaborated that environmental disturbances and over exploitation of natural resources leads to the prevalence of natural catastrophes including flood, drought, water-logging, excessive heating and the like which are the immediate causes of famine in Ethiopia. It was also discussed that the rainfall variability, degraded soil, scanty vegetation cover which cause ecological imbalances coupled with improper and poor land management practices and the accelerating population significantly leads to production decline and enhances to the occurrence of famine in Ethiopia.

In Ethiopia, more than 95% of food grain production is from rain fed subsistence farm (Osman, 2003 cited in Adane, 2008). A study conducted in Ethiopia by Devereux (2002) revealed that a 10% decline in rainfall below its long term average reduces national food production by 4.4%.

### **C. Poor asset base of the rural households**

Yared (1999) in his study in Wagda concluded that household land holdings play the most fundamental role in determining grain and animal production in the rural economy. He added that in Wagda, access to drought power and labor participation are influenced by the size of the land people owned. Farm equipments and basic infrastructure are among the physical capitals that influence the day to day activities of rural households as producers and consumers. Dulla (2007) stated that ownership of machinery and equipment enables households to raise labor and land productivity and is especially helpful for households with relatively high opportunity costs for labor, such as those pursuing off-farm employments.

### **D. Economic factors**

The manifestations of economic problems are considered as the constraints of agricultural production. According to Degefa (2002), lack of cash, absence of off-farm incomes, shortage of farm oxen, shortage of modern farm inputs, traditional farm implements and practices were the major economic factors. In explaining the implications of these constraints, he stated that farmers with no ox are more vulnerable to household food shortages as they rent out their land to other farmers with better pulling power or has to get oxen on a rent which makes them loose some of their produce through shares.

In understanding the effect of economic factors in households' food production, research by Yared (2001) verify that agricultural inputs such as improved seeds, fertilizers, herbicides and farm implements which are vital to increase production and productivity are not well accessed by most peasants due to high cost of chemical fertilizers and improved seeds, poor performance of the market, lack of competitions and monopolization of input supply in the hands of the government, lack of access to credit facilities and low market values of agricultural producers.

### **E. Social factors**

According to Degefa (2002), social factors such as shortage of human labor, health problems, low levels of education, poor food rationing and absence of traditional saving are among the causes to the occurrence of seasonal food shortages in farm households.

In support to the above statement, Workneh (2000) states labor is an important determinant in peasant food production as most agricultural operations in small farming systems are labor intensive. Similarly, he argues that farmers' access to appropriate technologies and knowledge is crucial for raising agricultural production.

### **F. Socio-cultural factors**

Education has a tremendous influence on the food security status of households. Educational attainment by the household head could lead to awareness of the possible advantages of modernizing agriculture by means of technological inputs; enable them to read instructions on fertilizer packs and diversification of household incomes which, in turn, would enhance household's food supply ( Kidane *et al.*, 2005).

Socio-cultural events such as eating habit and food preference, cultural ceremonies and festivals also influence the food security status of the given communities and way of saving or expenditure, also directly or indirectly affects the food security situation of that particular community.

### **G. Political factors**

Inappropriate governmental policies and institutional weakness are main responsible factors for the recurrence of food shortage or poverty and underdevelopment in general. Whenever food shortage or famine occur in a given country, the government is responsible for either causing the crisis or failing to prevent it. In Ethiopian circumstances lack of appropriate development polices and strategies is one of the main factors which results vulnerability to disaster (Degefa, 2002).

As explained by Getnet (2002), the neglect of peasant agriculture in the formulation and execution of macro- economic policies, focusing on growth through industrialization during the

Imperial Regime producers' cooperatives and state farms, during the Derg Regime, as well as the poor agriculture-industry linkage by the current FDRE Regime are the major causes of poverty and food insecurity in rural Ethiopia. In strengthening the above argument, Degefa (2002) also accounted the recurrence of famine since 1950s largely to the failure of the government to combat poverty and food shortage.

## **H. Access to infrastructure**

Access to infrastructure such as market center and roads promote livelihood diversification and agricultural intensification. Adequate infrastructure, especially main and feeder roads that improve access to necessary input-fertilizer, seed, pesticide chemicals and other agricultural implements are very indispensable (Osman and Tesfahun, 2003). Although, the current government has made a significant progress particularly in road development, the sector is still weak even compared with the African average. World Bank (2007) reported that due to lack of proper and on time transportation facilities, the total post harvest production loss reached up to 30%.

Generally, as indicated in many literatures, inadequate infrastructures and social services development such as road, transportation, communication, electrification, appropriate technology, education and health services and agricultural services would be the major challenges to sustain the growth of agricultural production and food security.

### **2.7. Food security: measurement and indicators**

It is important to measure and monitor food security over time because it is fundamentally linked to wellbeing. Measurement is necessary at the outset of any development project to identify the food insecure, assess the severity of their food shortfall and characterize the nature of their insecurity (seasonal versus chronic). Furthermore, it provides the basis for monitoring progress and assessing the impact of these projects on the beneficiaries' food security (Hoddinot 1999). Tassew (2006) points out that the multiple dimensions of food security in both space and time (local and regional, chronic and transitory, short-term and long term) as well as in levels (global, national/regional, household, and individual) make assessment of food insecurity a difficult task.



There is no single indicator for measuring food security. The decision to rely on a particular method usually depends on resources and time constraints, objective of the study, available data, type of users and degree of accuracy required (Debebe, 1995). For this purpose, different indicators are needed to capture the various dimensions at the country, household and individual level. At the national or regional level, food security can be measured in terms of food demand (requirement) and supply indicators.

In general, food security indicators are classified into two main groups, i.e, process indicators and outcome indicators. Process indicators provide estimates of food supply and food access situation, where as outcome variables serve as a proxy for food consumption (Frankenberg, 1992).

Process indicators are divided in two. Those indicators that reflect food supply and indicators that reflect food access. They are used to measure the changing status of food security, offer the type of information necessary to plan and adjust development efforts. It has two groups: supply indicators and access indicators.

Outcome indicators are used to measure the status of food security at a given point in time, and grouped into direct and indirect indicators. The direct indicators of food consumption include actual food consumption rather than to marketing channel information or medical status. The indirect indicators include storage estimates, subsistence potential ration, household perceptions of food insecurity and nutritional status assessment (Nigussie *et al.*, 2012). Some of the problems with outcome indicators like anthropometrics are their results may not exactly indicate the level of food crisis. It is because nutritional intake is affected by a number of factors such as health and sanitation.

Both process and outcome indicators are important when assessing food security, but access indicators measure that food access become apparent when government and development agencies realize existence of household food insecurity and amine conditions are occurring despite the availability of food. In recent years, access indicators have been seen as relatively more valuable in development planning, implementation and monitoring of food security interventions. At the household level, food security is measured by actual dietary intake of all household members using household income and expenditure survey. However, expenditure data

is more reliable than income data (Tassew, 2006). Using a survey data the minimal standard of living is proxy by the level of consumption expenditure that will enable the household or individual to attain the basic needs.

Accordingly, the cost of basic needs was calculated based on data of the lowest income quartile in order to measure household food security and to calculate the cut-off points beyond which a household is food secure or not.

Food security at household level can also be measured by households' food or calorie acquisition/consumption per adult per day. The calorie consumed by the household is compared with the minimum recommended calorie of 2100 kcal per adult per day. If the consumption/acquisition is less than the recommended amount then, the household is categorized as food insecure and if greater than, as food secure. But, it is not obvious to respondents how they could manipulate their answers. Because the questions are retrospective, rather than prospective, the possibility that individuals or households will change their behavior as a consequence of being observed is lessened (Hoddinott, 1999).

A good measure of consumption requires data on household food consumption, household size, age and sex of individuals, as well as physical size and activity levels. Even if average size and activity levels are presumed, consumption measures capture only the physiological sufficiency elements of food security.

## **2.8. The food security strategy**

In 1996, the Ethiopian government developed a draft Food Security Strategy and in 1998, a Regional Food Security Program, which was targeted to tackle the problem of food insecurity in the four major regions namely, Tigray, Amhara, Oromia and SNNPR was developed.

The first version of the food security strategy was prepared in 1996 and was revised recently through intensive dialogue and broad participation of the federal, regional and donor community. The revised strategy targeted mainly at the chronically food insecure moisture deficit and pastoral areas. It is characterized by a clear focus on environmental rehabilitation as a measure to reverse the current land degradation. At the same time the focus on biological measures as a

source of income generation for food insecure households differentiates it from the 1996 strategy. Water harvesting and introduction of high value crops, livestock and agro-forestry development have been new elements in the revised strategy. In recognition that the pursuit of food security is a long term and multi-sector challenge, institutional strengthening and capacity building is included as sectoral element of the strategy. As in the past, however, the overall objective of the FSS is to ensure food security at household level, while the rural development policies and strategies (ADLI), would focus on ensuring national food self-sufficiency (FDRE,2002).

The strategy is intended to address both supply and demand sides of the food equation: availability and entitlement, respectively within the framework of National Agricultural and Rural Development Strategies. This could be affected from the perspective of ensuring both food security at national and household levels taking into consideration the diverse nature of the country's economy. The strategy adopted rests on three pillars: Increasing the availability of food through domestic (own) production; ensuring access to food for food deficit households; and strengthening emergency response capabilities (FDRE, 2002). These three pillars are briefly revised here under.

### **1. Increasing domestic production**

According to the strategy, availability of food is going to be increased by intensification and opening up new lands for cultivation, as well as diffusion of simple technology packages to small landholder farmers in areas where there is reliable rainfall. These include introduction of irrigation in areas with less reliable rainfall; and enhancement of livestock products through improved livestock breeds, better nutritious animal feeds and better animal services as the main ingredients to stimulate increase in food production. In addition, to promote food production, the strategy anticipates to create a stable macroeconomic environment, encourage the private sector to invest in agricultural production, processing and marketing, intensify agricultural research and training programs, strengthen security of access to land and improve small farmers' access to better rural roads to promote the expansion of rural enterprises that generate nonfarm incomes. In addition, the strategy incorporates the need to create employment, increase and diversify agricultural exports and address the specific problems of pastoral areas (Dagneu, 2000).

## **2. Ensuring access to food**

Food insecure farming households as well as the non-farming community get some and/or all of their food from the market. Farmers need market to supplement their own production while the latter use it as the only source. To purchase food from the market, households need sufficient income that can cover at least their minimum food and non-food requirements. However, many households in the drought prone and moisture deficit as well as urban areas lack sufficient income to meet their basic needs (FDRE, 2002). With respect to the above perspective, the revised strategy has indicated food security measures aimed at addressing demand side problems within the framework of the Rural Development Policies and Strategies. These include the following.

### **A. Micro and small-scale enterprises**

The envisaged market led agricultural development is expected to lead to large-scale direct and indirect growth in non-farm incomes and employment. To this effect, the strategy points out promoting and strengthening micro and small-scale enterprise development through industrial extension services. These developments are believed to create additional employment opportunities in the private sector (FDRE, 2002).

### **B. Improving the food marketing system**

The policy of the government regarding agricultural marketing and distribution is to encourage the participation of the private sector and cooperatives to improve the efficiency of the system. On the marketing front, business enterprises are expected to play significant roles in stabilizing prices as well as reaching farmers who are far from agricultural input market. To benefit from all these policy measures, the food security strategy emphasizes on measures related to establishment of market stabilization schemes (for prices of strategic food crops) along with agricultural price and market information system (FDRE, 2002).

### **C. Supplementing employment and income-generating schemes**

The strategy points out off-farm income generating activities would help supplement own production for a considerable number of farmers as coping mechanisms during periods of food shortages. To this effect, public employment generation schemes are proposed. This would intern

help contribute to soil conservation, the construction of roads, small-scale irrigation, water supply and sanitation. This again leads to food production increase, reduce real rural food prices and improved health conditions. It would also help improve environmental protection and natural resource conservation.

#### **D. Targeted program**

These programs are primarily designed to transfer resources aimed at both developing capacity for self provisioning and support vulnerable groups, who would not be capable of self – provisioning during short and medium term. The former scheme is aimed at provision of inputs (seed and fertilizer), small agricultural tools and implements to resource poor farmers (food insecure) extending small loans to destitute women to help them develop sustainable livelihood. The latter scheme involves cash transfers to orphans, the aged and handicapped or self targeting food subsidies for particular vulnerable groups (FDRE, 2002).

### **3. Emergency capabilities**

In addressing the risks of household food security, the strategy focuses on strengthening emergency capabilities such as the monitoring surveillance and early warning arrangements, the capacity for food and relief distribution, strategic reserves of food grains, and its analysis of the international food trade and aid situation. Strengthening such capabilities is noted to be based on the successful experiences and a focus on developing decentralized distributive arrangements (Dagnew, 2000). Generally, although the development of food security strategy is considered as a positive step in addressing the deep-rooted food insecurity problem in Ethiopia, a number of weaknesses are identified with the overall conception of food security issues by policy makers and practitioners.

One major weakness as pointed out by Yared (2001) is lack of recognition of the dynamic and multi-dimensional nature of food security and the subsequent little importance attached to food security by policy development practitioners. The failure to promote it as a cross-cutting issue to be addressed in development program components is another area that needs a closer look.

## **2.9. Household coping strategies with food insecurity**

Coping Strategies are defined as a careful pre- plan adopted, as a mechanism to attain food security at the time of food shortages in a household (Frankenberger, 1992). Households actively try to protect their livelihoods, adopting several actions and mechanisms when faced with shocks and stresses that affect their livelihood or livelihood outcomes, one of which is food security. These behavioral responses are termed “coping strategies” and encompass a wide range of economic, social, political and behavioral responses to declining food security or perceived threats to food security. They need to be understood in terms of strategies with easily reversible effects, versus strategies that incur unacceptable costs (Yared, 1999).

Webb and von Braun (1994) discovered that coping mechanisms adopted by households form a continuum of strategies from “risk minimization” to “risk absorption” and finally to “risk taking”. Risk minimization involves asset accumulation, saving and income diversification. Risk absorption follows on from risk minimization and involves drawing on savings and existing food reserves, and often restriction of consumption of food and non-food items. The final stage is risk taking which involves households taking desperate measures, such as breaking up the family through migration, consumption of survival or famine foods and sale of private possessions.

Many of the household responses, especially during the last phase, clearly have irreversible impacts on household well-being, and conditions get worse unless external assistance arrives. Due to the irreversible nature of the risk-taking strategies and their adverse impact on post-crisis recovery, households would be reluctant to sell assets, especially agricultural assets in an agrarian community, and would only do so as a measure of last resort (von Braun and Webb, 1994).

Typically, food insecure households employ any of the four types of consumption coping strategy. First, households may change their diet (switching from preferred foods to cheaper, less preferred substitutes). Second, a household can attempt to increase its food supplies using short term strategies that are not sustainable over a long period (borrowing or purchasing on credit, more extreme examples are begging on consuming wild foods, or even seed stocks). Third, households can try to reduce the number of families that they have to feed by sending some of

them elsewhere (anything from simply sending the kids to the neighbors house when they are eating to more complex medium term migration strategies). Fourth, most common households can attempt to manage the shortfalls by rationing the food available to the household, i.e., cutting portion size or the number of meals, favoring certain household members and skipping whole days without eating (Maxweel *et al.*, 2003 cited in Bereket, 2013).

Coping mechanisms used by farm households in rural Ethiopia include livestock sales, agricultural employment, and certain types of off-farm employment and migration to other areas, requesting grain loans, sale of wood or charcoal, small scale trading, selling cow dung (in central Ethiopia) and crop residues, reduction of food consumption, consumption of meat from their livestock, consumption of wild plants, reliance on relief assistance, relying on remittance from relatives, selling of clothes, and dismantling of parts of their houses for sale (FSP, 2003; Yared, 1999; Dessalegn, 1990). Similarly, when faced with famine, Ethiopian villagers were shown to draw on savings, use food reserves, diversify sources of income and reduce expenditure on non-food items in the initial stages on the famine, whereas during the later stages of the famine, they switched to consuming famine foods, and even migrated (von Braun and Webb, 1994).

Copping strategies though vary from place to place and household to household, the most commonly used sequence of responses farm households typically employ as sequential coping mechanisms when faced with a food crisis summarized diagrammatically by numerous authors. These can be grouped in three stages: first stage (insurance mechanism), second stage (disposal of productive assets), and the third stage (stage of destitution) refers to distress migration (Frankenberger, 1992; Debebe, 1995).

## **2.10. Concluding remarks**

Much of the reviewed literature on household food security concentrated on describing qualitatively and quantitatively, the extent of household food insecurity; identifying the factors and examining their implications. In almost all studies reviewed, there were no statistical explanations on determining sample size

## **CHAPTER THREE**

### **METHDOLOY**

#### **3.1. Introduction**

The purpose of this chapter is to provide an overview of the different phases and steps followed to conduct the research.

#### **3.2. Description of the study area**

##### **3.2.1 Physical characteristics**

Meskan Woreda is situated in the Gurage zone of the Southern Nations, Nationalities and Peoples Regional State. It is one of the 15 Woredas of the Zone. The capital of the Woreda, Butajira town is located at 133km south of Addis Ababa, from the capital town of Southern Nations, Nationalities and Peoples Regional State (Hawassa) 155 km and from its capital Zone (Welkite) 233km. The Woreda is bordered by Sodo Woreda in the North, Selite Zone in the South, Mareko and some part of Sodo Woredas, and Muhere Aklile, Silite Zone and Gedebano Gutazer Welene Woreda in the West. The Woreda has 43 Kebeles of which 37 are rural and 6 urban.

Meskan Woreda covers 50,177 hectares. Almost 31.3% of the area is covered by annual crops, 9.9% by perennial crops, 25.22% by forest and 26.73% by others. Its elevation ranges from 1501-3500 m above sea level. Astronomically, it is situated between 7.993515-8.278101°N Latitude and 38.26-38.5786° E Longitude.

Agro-climatically, the Woreda is classified into Weina-Dega (mid high land- 80%) and Dega (high land- 20%) in which the average temperature ranges between 7.5 to 17.5 ° c. The average rainfall of the Woreda varies between 1001mm to 1200 mm. The topography of the area is dominated by rugged terrain 35%, about 10% mountainous and the remaining 55% is plain. The major soil types include 22% red, 25% brown and 53% is black soil. Based on the 2012/13 Regional Abstract Report, its elevation ranges from 1501-3500 mm above sea level and the mean annual rainfall ranges between 1001- 1200 mm.



As far as the 2012/13 annual crops is concerned, the area coverage of maize and sorghum at Belg season is 5418.5 and 799 hectares of land, respectively. During Mehere season, tef and wheat cover 2294 and 1766.38 hectares of land, respectively and 2070 hectare of the land is covered by other crops. Similarly, the use of Urea and DAP fertilizers at Belg season in the Wereda is estimated at 5418.5 and 5418.5 quintal, respectively, and for the Mehere season 5683.94 and 4418.86 quintal, respectively ( Annex 5 ).

### **3.2.2. Population, religion and culture**

According to the regional statistical abstract report in 2012/13, Meskan Woreda has a total population size of 179,719, of which 87,933 (48.92%) are male and 91,796 (51.08%) are female. It also consists of a total of 36,377 households with a male headed of 23,004 households (63.24%) and female headed of 13,373 households (36.76%). Regarding settlement pattern, urban and rural cover 13,138 (7.31%) and 166,581 (92.69%), respectively. The major ethnic group of the Woreda is the Gurage, sub-divided into the Sodo, Meskan, Silti and Mareko clans. The population is predominantly Muslim. Polygamy is witnessed as an aspect of marital life among the Muslim population. The majority among the Sodo practice Orthodox Christian.

### **3.2.3. Socio-economic profile**

Rural households live in traditional round houses (tukuls) made of wood and plastered with clay, covered by thatched roofs. The majority of rural households share their living quarters with their domestic animals. Water (for both human and animal use) is mostly obtained from springs, rivers and well.

The majority of the rural people are engaged in subsistence agriculture. Oxen culture and traditional farm implements are employed to manage small and fragmented plots. Maize and Sorghum are the major staples in the Woreda. Poor households often engage in petty trades and hired labor to supplement meager incomes derived from farm activities.

Many rural households in most part of the Woreda face acute food shortage due to the recurrent drought and low agricultural productivity. According to the 2012/13 Meskan Woreda report, 24 Kebeles are by now using the productive safety net program (PSNP). In the PSNP, there are

people or users are participating in public works and at the same time there are people or users who are not participating in public works. (Please look at Annex 4). Sale of fuel-wood and using natural vegetation covers as source of energy remains to be the only option for ensuring the mere kind of existence.

#### **3.2.4. The study Kebeles**

The study Kebeles, Beresa and Dobo Tuto and Semen Shershera are located approximately at similar distance from the capital Butajira which is around 5 km. According to the Meskan Wereda Agricultural and Rural Development report of 2010, there are around 4,194 people living in Beresa Kebele, 2,688 in Dobo Tuto Kebele and 3318 in Semen Shershera. Both of these Kebeles share similar agro-climatic zone that ranges between Woinadega and Kola. Topographically, they are characterized by rugged, mountainous and rocky landscapes. Most areas also have infertile sandy soils for crop cultivation.

Throughout the years, the study sites are one of the few most neglected areas in the country. . The neglect, coupled with the recurrence of natural adversities and the entrenchment of harmful traditional practices, has rendered the area to be fragile beyond imagination in terms of misery and destitution. Agricultural activities, even under normal times, often fail to sustain life for a prolonged period time. Previous researches in the study area revealed that there is usually acute shortage of food approximating semi-starvation for most households lasting about 8 months within a time span of one year. Low productivity, absence of alternative employment other than farming and natural calamities, exacerbated by harmful socio-cultural and economic practices account for poor wellbeing of the people in the study areas.

#### **3.3. Research design and sampling**

The study employed a cross-sectional survey design to explain the situation with a holistic assessment of both quantitative and qualitative data obtained from a questionnaire on multiple characteristics of household food (in)security. Meskan Woreda is purposively selected because of its highly traditional and subsistence rain-fed type of economy, recurrence of natural adversities and low level of development. The actual study was conducted from February 2014 to May 2014.

The researcher used purposive sampling technique to choose three kebeles, namely Beresa, Dobo Tuto and Semen Shereshera out of the 43 Kebeles in the Woreda. The reason to purposively choose these three kebeles is primarily based on the intensity of vulnerability of the areas to seasonal food insecurity. Besides, the accessibility of the Kebeles to the Woreda town and transport network could be mentioned as prime factors for purposively choosing those sites.

The total number of households in Beresa, Dobo Tuto and Semen Shereshera Kebeles was taken as sample framework. The data on the total number of households in the three Kebeles was obtained from the respective Rural Kebele Administration Offices. Accordingly, out of the three rural Kebeles administrations data, the Beresa Kebele has 632 households, the Dobo Tuto Kebele has 410 households and that of Semen Shereshera has 534 households. The sample size used for the study is one hundred and twenty (120) households were taken from the three Kebeles, using a simple random sampling technique. .

During this process, the lists of household heads in each kebele were used to make randomization of the farmers. A structured survey questionnaire was designed and pre-tested to collect the primary data. Prior to data collection, the questionnaires language were converted from English version to Amharic.

One supervisor and three enumerators were recruited to collect the data. The parameters used to recruit the enumerators were their proficiency in communicating using local language, educational background and prior experience in similar works. Those enumerators and supervisor were Development Agents working in Meskan Woreda Agricultural and Rural Development Bureau. Just before the data collection, the researcher gave half- day long training on how to approach farmers, how to conduct the interview and how to convince the respondent to get relevant information on sensitive economic and social issues. After they were made aware of the objective of the study and content of the questionnaire, pre-test was conducted under the close supervision of the researcher if there might be any unclear or added questions. Some amendments were made to the questionnaire and then the data were collected under continuous close supervision of the researcher.

### **3.4. Data collection**

#### **3.4.1 Primary data**

The primary data on which the study was largely based were collected from sampled farmers in the study area. A formal survey method was employed using a structured questionnaire. Before starting the actual data collection, the questionnaire was pre-tested and on the basis of the results obtained, the necessary modifications were made to the questionnaire.

The household heads were asked about food security and related issues to gather qualitative and quantitative data pertaining to household demographic characteristics, asset possession, off-farm/non-farm income, livestock ownership, types and amounts of food eaten by the household in a specific period. Other additional data were also collected including resource endowments, farm technology use, access to credit, accessibility of farm inputs, attitudinal and other aspects of households including food and non-food consumption and expenditures. The primary data were asked where elderly and knowledgeable people about the area were asked on various issues of the study. Similarly, the coping strategies practiced by the households were also collected at different levels.

#### **3.4.2. Secondary data**

Relevant data were collected from secondary sources. The secondary sources of information include published and unpublished documents about agricultural production and food security in the study area. This information was collected from Meskan Woreda Bureau of Agriculture and Rural Development, policy documents, books, reports, internet, planning bureaus and knowledgeable individuals.

#### **3.4.3 Personal observation**

Observation of the study Kebeles was carried out before and during the study period by the researcher. The researcher's observation of the study Kebeles therefore, has contributed to substantiate some of the findings of the study.

### **3.5. Data Analysis**

#### **3.5.1 Descriptive analysis**

Following data collection, the data were coded and entered into the SPSS Version 20 computer software package for analysis. The farm household data were analyzed using both descriptive and econometric methods of analysis. The descriptive statistics like mean, variance, standard deviation, frequency distributions, ratios, percentage, graphical and tabular analysis were used to explain the situation of demographic and socio-economic situations of the farm households (analysis of the surveyed data is described in detail in Chapter 4).

#### **3.5.2. Econometric model analysis**

The core aim of this investigation was to identify the major causes of food insecurity among farm households in the study area. Statistical models can be fitted to establish the causal relationship between the household characteristics and food insecurity in such a way that the food security/ insecurity is a function of household characteristics and other variables.

Linear Probability Model (Linear Regression), with proportion of success as the outcome variable, could be used to fit qualitative response regression model. But, the limitation of this model is that the predicted probability values can lie outside the admissible range 0 to 1 and prediction errors can be very large. Besides, although the linear probability model is often used because of its computational ease, outcomes are sometimes predicted with certainty when it is quite possible that they may not occur. The upper limit difficulty of linear probability model can be addressed by replacing odds ratio in place of proportions. But this too has its own shortcoming in that we cannot logically state the effect of regressor on the odds is linear, as factors that affect the odds are multiplicative. Logit (logarithm of odds) will not only solve the floor constraint of linear probability model but also enables to state the effect of each predictor variable on the logit of the odds (Getachew, 2000).

Logistic model, as compared to its competitor, the probit model, is that its direct interpretation in terms of the logarithm of the odds in favor of a success. It is less sensitive to outliers and easy to correct a bias (Collet, 1991) In instances where the independent variables are a categorical or a mix of continuous and categorical, logistic is preferred to discriminant analysis. The assumptions required for statistical tests in logistic regression are far less restrictive than those for ordinary

least squares regression. In general, logistic regression model has a peculiar property of easiness to estimate logit differences for data collected both retrospectively and prospectively (Collet, 1991), have contributed a lot to its importance in application areas. Because of the reasons discussed above, the logistic (logit) regression model was used in order to address the issues in the study. The logit model is defined as follows. The results were described/ interpreted in tabulation and cross tabulation, frequency, percentages, and computation of descriptive statistics such as mean, and standard deviation form.

Hence, the study employed a logit model (Equation 1) with the dependent variable (food security) being a binary variable having a value of one if a household was found to be food secure, and a value of zero otherwise (Collet, 1991):

$$P = \left( Y = \frac{1}{x_i} \right) = \frac{1}{1+e^{-z_i}} = \frac{e^{z_i}}{1+e^{z_i}} \quad (1)$$

Where  $e$  is an exponential term,  $P_i$  is the probability of household  $i$  being food secure. It is 1 if a household is food secure, otherwise 0.

$Y$  is the observed food security status of a household.

$X_i$  is the household set of explanatory variables

$Z_i$  is a function of  $n$ -explanatory variables ( $X_i$ ) which can be expressed in linear form as:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

From Equation 1, the probability of a household being food insecure is given by  $(1 - P_i)$  which can be written as Equation 2:

$$1 - \frac{1}{1+e^{-z_i}} = \frac{1+e^{-z_i}-1}{1+e^{-z_i}} = \frac{e^{-z_i}}{1+e^{-z_i}} \quad (2)$$

Therefore, the odds ratio  $\frac{P_i}{1-P_i}$  is given by Equation 3:

$$\frac{P_i}{1-P_i} = \frac{1+e^{z_i}}{1-e^{z_i}} \quad (3)$$

Now  $\frac{P_i}{1-P_i}$  is the odds ratio in favor of food security. It is the ratio of the probability that a household would be food secure ( $P_i$ ) to the probability that a household would be food insecure ( $1-P_i$ ).

Finally, taking the natural logarithm of Equation 3 and assuming linearity produces Equation 4:

$$L_i = \ln \left[ \frac{P_i}{1-P_i} \right] = Z_i \quad (4)$$

Where  $L_i$  is the logarithm of the odd ratio which is assumed linear for both variables and parameters.

If the disturbance term is introduced, the logit model in Equation 4 is represented by Equation 5:

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \epsilon_i \quad (5)$$

In Equation 5, the terms  $\beta_i$  are parameters to be estimated, and  $X_1$  to  $X_n$  are explanatory variables such as: age of the household, sex of the household head, family size, education of the household head, farm size, livestock ownership, number of oxen, fertilizer use, off-farm income and access to credit access, respectively.

### 3.5.3. Definition of model variables

#### The dependent variable

The dependent variable in this study is Household Food Security (HFS) status. Consumption based rather than income-based measure of HFS status is used in this study. This is because consumption better captures long-run welfare, and it better reflects household's ability to meet their basic needs. Consumption is preferable to measure HFS than income because it is less vulnerable to seasonality and life-cycle, less vulnerable to measurement errors because respondents have less reasons to lie, it is closer to the utility that people effectively extract from income, and for the poor most of income is consumed.(CSA, 2005; FAO, 2002).

The HFS status was determined using the consumption approach based on the 2012/13 household income consumption expenditure survey. Following this approach, household food

security status was set on the basis of the caloric content of consumed food items. To do this, first the bundle of food items consumed by households was listed and measured in terms of 100 gram solid food using conversion factors for the liquid and semi-liquid food items. Second, for each food item a caloric content value was assigned based on the 1998 food composition table by Ethiopian Nutrition and Health Research Institute (ENHRI) which is given in Annex 3. Total Net Calorie (TNC) was estimated based on the total edible portions of weights of consumed food items for each household. Third, due to differences in household compositions in terms of age and sex, there was a need to adjust the household size to adult equivalent household size. Adult equivalence was developed by World Health Organization (WHO) considering the nutritional requirements of an individual by age and gender. Adult equivalence table given in Annex 3 is used as a reference to calculate adult equivalent household size in this study.

Finally, the HFS Status was defined based on the consumption per adult equivalent per day. This is given as:

$$HFS_i = \frac{TNC \text{ consumed by household in one day}}{Adult \text{ equivalent household size}} \quad \text{where } i=1,2,\dots,120$$

Following the Food Security Strategy of the Federal Democratic Republic of Ethiopia (1996) and FAO (2002), 2100 Kcal per day was assumed to be the minimum energy requirement enabling an adult to lead a healthy and moderately active life in Ethiopia, particularly in the study area. Households whose consumed calories were found to be greater than their calorie requirement were regarded as food secure and assigned a value of 1, while households who faced with calorie deficiency during the study year were regarded as food insecure and they were assigned a value of 0. Hence, the dependent variable, food security status of the *i*th household, was measured as a dichotomous variable:

$$Y_i = HFS_i \geq 2100 \text{Kcal (Food secure),}$$

$$Y_i = HFS_i \leq 2100 \text{Kcal (Food insecure),}$$

Where  $Y_i$  is food security status of the *i*th household,  $i \in 1,2,\dots,120$



## Description of explanatory variables

In order to identify the potential explanatory variables that would expect to influence household food insecurity were all categorical. The household food security status was taken as dependent variable for the logit analysis had a dichotomous value representing the status of household food security status. It was represented in the model by a value of 1 if a given household belongs to food secured and 0 for food insecure household. The independent variables, which are expected to have associations with food security status, were identified as household-demographic characteristics, economic resources, agricultural technology use, estimated income, access to credit, attitudinal and other variables defined as follows:

Table 1. Description of selected explanatory variables

<b>Variables</b>	<b>Description</b>	<b>Values</b>
AGE	Age of head of household	Years
SEX	Sex of head of household	0= Female, 1=Male
FSIZE	Family size	Number
EDUC	Educational level of head of household	Years
FLSZ	Farm land size of a household	Hectare
TLU	Total number of Livestock ( Excluding oxen)	TLU
OXEN	Number of oxen owned by the farm household	Number
FRTLZR	Use of Fertilizer	1= Yes, 0= No
OFFFARM	Off-farm income participation	0= Non-participated, 1= Participated
CREDIT	Use of farm credit	1 = Yes 0 = No

Based on the reviewed literatures, some of the common predictors that are expected to influence rural household's food security in the study area were described as follows:-

- 1. Age of head of household (AGE in years):** Older people have relatively richer experiences of the social and physical environments as well as greater experience of farming activities (Haile *et al.*, 2005). That is, when household heads get older, they are expected to have stable economy in farming. Moreover, older household heads are expected to have better access to land than younger heads, because younger men either have to wait for land redistribution, or have to share land with their families. However, Babatunde (2007) and other related studies stated that young household heads were stronger and expected to cultivate larger-size farm than old heads. Hence, the expected effect of age on household food security could be positive or negative. A prior expectation is positive.
  
- 2. Family size of the household head (FSIZE - in number):** The expectation is that the household with large number of children or economically dependent family members will face food *insecurity* because of high dependency burden. The existence of large number of children under age of 15 and old age of 60 and above in the family could affect the food security status of the household. Meaning that the working age population (i.e., 15-60 years) supports not only themselves, but also additional dependent persons in the family. Thus, it was hypothesized that the family with relatively large number of dependent family members (high dependency ratio) negatively affects household food security status.
  
- 3. Sex of the household head (SEX).** In this study, female-headed households were expected to be more food insecure than male-headed households. Hence, in this study sex is expected to be positively related with household food security status.
  
- 4. Education status of household head (EDUC):** The impact of education on household food production might be through promoting awareness on the possible advantages of modernizing agriculture through technological inputs and by diversifying household incomes, which in turn enhance household's supply. Households led by non-literate heads are less likely to understand modern farming technologies provided to them through any media like extension workers, radio and others than literate household heads. The covariate education assumed binary values and was expected to have a positive influence on household food security status.

- 5. Livestock ownership (TLU):** The livestock holding of the household was measured by the number of Tropical Livestock Unit (TLU). Livestock contribute to household's economy in different ways, for instance, as a source of pulling power, source of cash income, source of supplementary food, and means of transport. Besides, livestock are considered as a means of security and means of coping during crop failure and other calamities (Haile *et al.*, 2005). Conversion factors were used in order to change each livestock of a household to its equivalent TLU, which are given (Annex 2). Positive correlation is expected between livestock ownership and household food security status.
- 6. Number of oxen ownership (OXEN):** Number of ploughing oxen is another determinant of the food security status of households. Oxen serve as a source of traction in many developing countries, thereby significantly affecting household's crop production. Animal traction power enables households to cultivate greater source of land and to execute agricultural operations timely (Haile *et al.*, 2005). Therefore, a positive relationship between oxen ownership and food security is expected in this study.
- 7. Total annual cereal yield (YIELD):** Total annual cereal yield (in kilogram) produced by the household head from November 2012 to November 2013. The lower the amount of grain food obtained from own production, the more likely the household to be food insecure. The mean value of yield of the sampled households was taken for categorization.
- 8. Use of Fertilizer (FETILIZER):** According to literatures, fertilization use could increase agricultural production and influence positively the food security status of a household.
- 9. Off-farm Income (OFF-FARM):** Participation in off-farm income generating activities is an important aspect to increase household income. This was measured by whether or not a household head involved in diversified income sources such as selling firewood, working on farms as daily laborers and running petty or small trade. Households who did not engage in off-farm activities are more likely to face food deficit if farm income is not enough. A

dummy variable was used to denote this variable. The expected impact of off-farm on household food security status was positive.

**10. Food aid (AID):** The study area frequently faces food shortage and its productive resources particularly, land is less productive. Therefore, the frequency of food aid distribution and its amount obtained by farm households is one indicator of food insecurity. Hence, the study Kebeles are one of the drought affected parts of Mekan Woreda. In this study, households with dependency attitude on food aid were expected to be more food insecure than others. A dummy variable was used to denote the variable and the expected impact on household food security was positive.

**11. Farmland size (LSIZE):** Total cultivated land owned by household is important resource for food production. Hence, it is expected to be associated with food security status. It was hypothesized that farmers who have larger farm landholding would have less probability to be food insecure.

**12. Total income (TINC):** Income determines the household's access to food. It is an important variable distinguishing the food secure and food insecure households in that those who have earned relatively larger income per AE (adult equivalence) could be more food secure. It is expected that the total annual income per AE and food insecurity are negatively related.

**13. Farm credit received (CREDIT):** Household who received farm credit has possibly to invest in farming activities, which is an important component in small farm development programs. In the study area, farm households who have easy access to credit at times of peak season of cultivation avail it and increase their production. Hence, it was expected that credit in general have a positive impact on food security status.

## **CHAPTER FOUR**

### **RESULT AND DISCUSSION**

#### **4.1. Introduction**

This analysis is based on data obtained from the questionnaire survey. The questionnaires of 120 farm households which remained after all questionnaires had been scrutinized for incorrectness and missing data, were grouped (classified) into two groups, namely food secure (number questionnaires) and food insecure (number questionnaires) groups. The data presented in the following discussion will draw a distinction between the two groups of households.

This chapter briefly presents the food security status, relationship of the selected predictor variables with the outcome variable in the farm households and also the econometric model analysis in the study area. The chapter concludes with by discussing the household coping strategies

#### **4.2. Food security status of the study area**

The proportion of households less than the recommended minimum daily intake of 2100Kcal is food insecure. In other words, the proportion of food insecure and food secure household is 102 (84.91%) and 18(15.09%).

#### **4.3. Bivariate analysis results**

The association between each explanatory variables and household food security status is conducted by cross-tabulating each predictor variables against the outcome variable. Moreover, a univariate analysis of variance (ANOVA) of each predictor variables against the household food security status is performed to identify the significant candidate predictor variables.

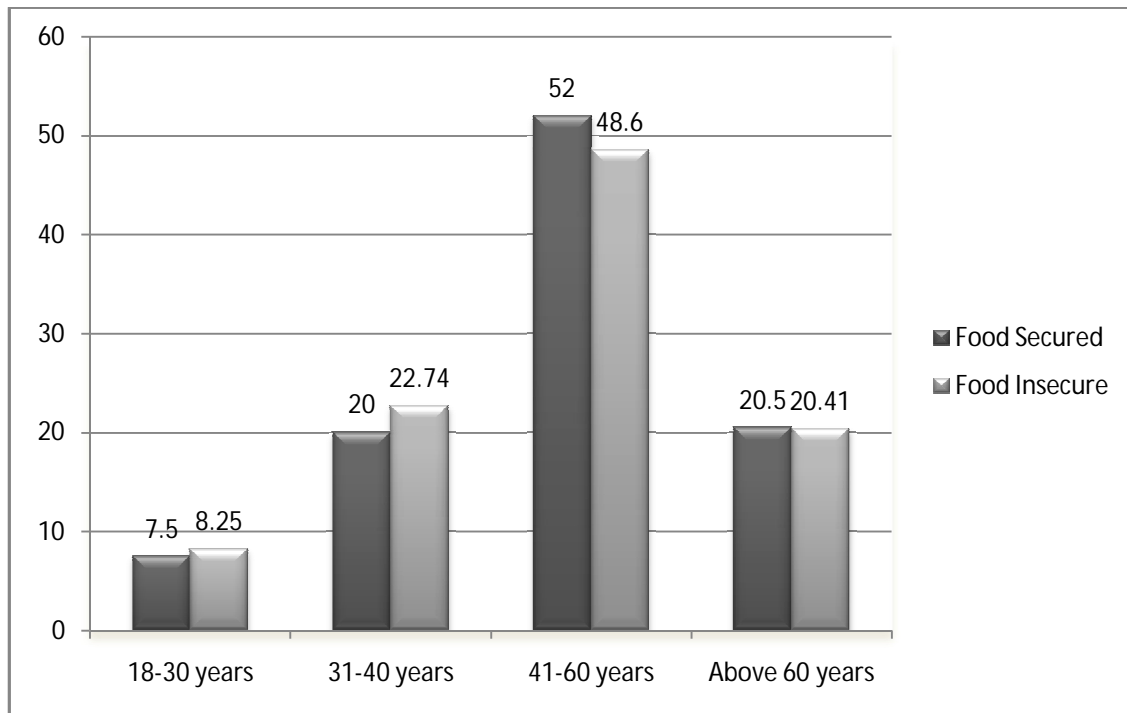
The major factors that are expected to determine household food security status were first analyzed by considering the relationship of each predictor variable with the outcome variable.

The major socio-economic variables identified in this analysis were the following:

**1. Age of the household (AGE):** The survey revealed that the age of the respondents ranged from 23-77 years with the average age estimated at 51 years. Out of 120 respondents, less than 7.87% were younger than 30 years, and about 20.46% were older than 60 years. The majority of the farmers (71.67%) were found in the age range between 31 and 60 years. The proportion of food insecurity is higher among households aged from 18-30 years (54.6%). It was argued that as the age of household increases, he/she could be less prone to be food insecure. Since he/ she acquires more knowledge and experience. In other words, it was expected that younger farmers are more likely to be food insecure than older farmers, that the older farmers due to better possession in terms of resource accumulation compared to that of younger farmers. Statistically, age was positively significant to the food security status.

The total number of members of the households was 1576, of which 50.7% and 41.7% were male and female, respectively. The proportion of children less than 15 years was 32.3%. The economically active age members (15-60 years) contributed 54.7% of the total size. Thus, the remaining 9.1% of the sample household members were above 60 years. The children (0-14 years) and youth (15-25 years) constitutes 71.9% of the total sample household members. The ratio between percent of young age group (0-14 years) and the old age group (greater than 60 years) to the labor force indicates the dependency ratio. This was found to be 121% and 8%, respectively. Hence, the overall dependency ratio in the study area is 129%. This means, every 100 persons within the economically active population groups support not only themselves, but also supporting 129 dependent household members with all basic necessities. This clearly shows a high dependency rate in the study area.

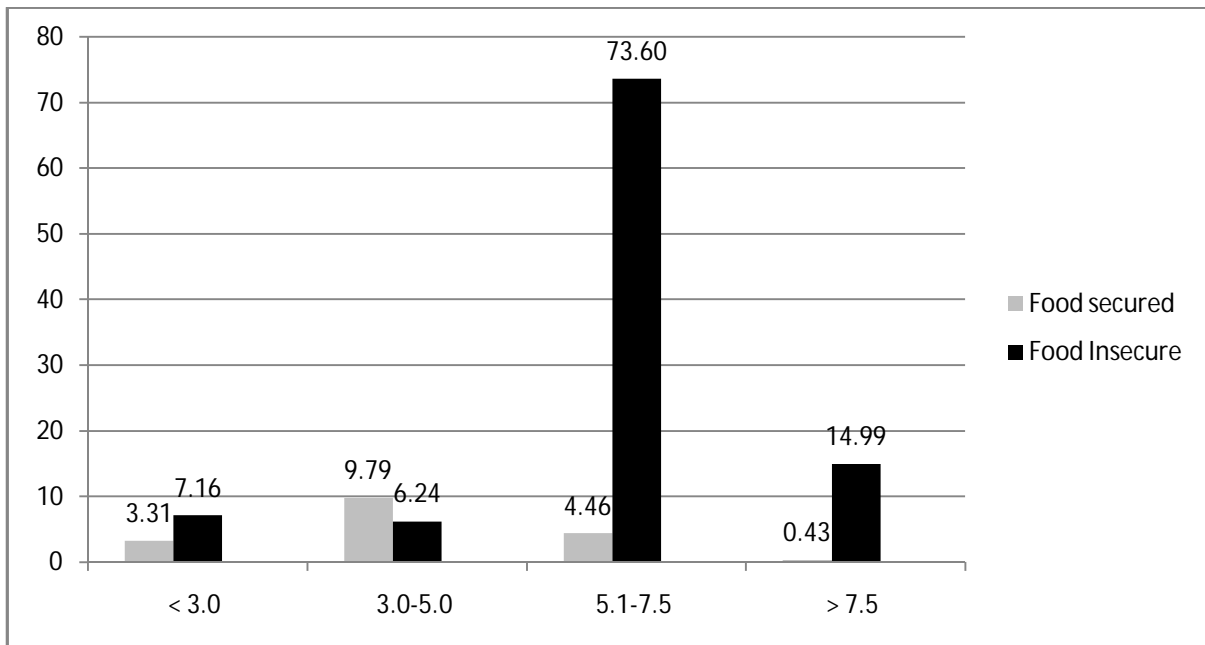
Figure 2: Distribution of household heads by age group



Source: Field work (2014)

- 2. Family size of the household (FSIZE):** The average family size of the sample households was 4.75 with a range of 1-9 persons. The majority of the farmers (91.2%) had more than 4.5 members. Family size was hypothesized to have a negative impact on the state of food security when family size is larger than sample mean (82.1%). In light of this, the statistical analysis showed significance difference (at 1% probability level) in mean family size between food secure and food insecure farmers. Moreover, the mean household sized expressed as AE exhibits significant difference at less than 1% probability level between the food secure and food insecure households. Higher the AE wouldn't necessarily mean that a household had sufficient adults to perform economic activities and escape from food insecure. Rather, the higher the food secure in AE, the larger the amount of food is required.

Figure 3: Distribution of household heads by family size

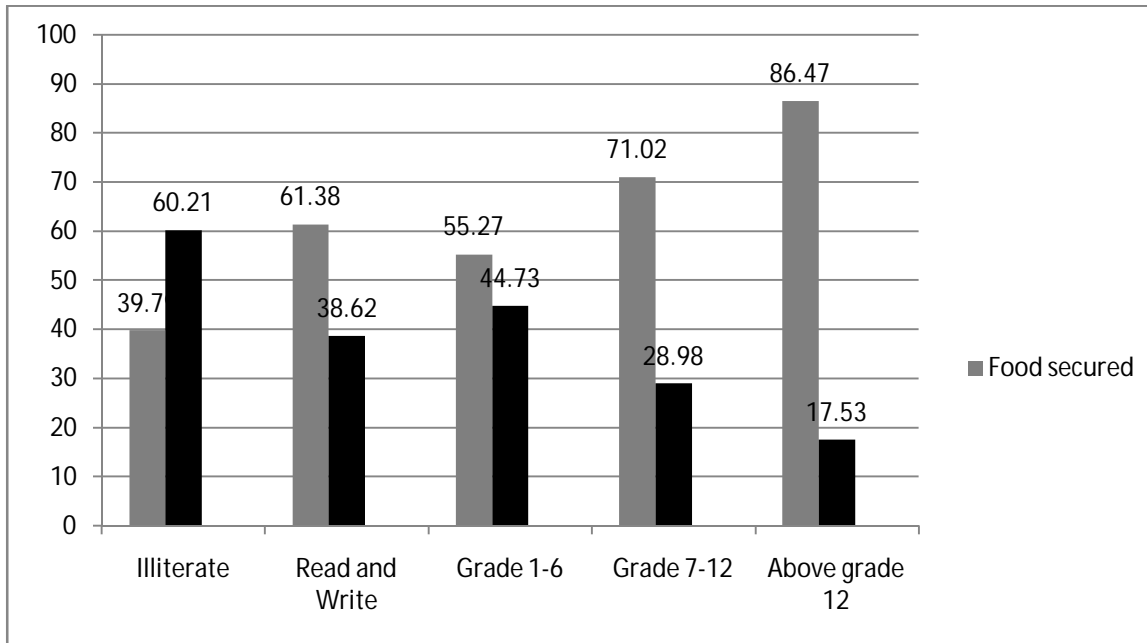


Source: Field work (2014)

- 3. Educational Level (EDUC):** Level of education of the household heads is assumed to influence the food security, since literate farmers would have a greater ability to obtain, process, and use information about improved technologies. The educational status of household heads in the study area was very low. Out of 120 respondents, 60.6% were illiterate, 23.5% were only read and write, 17.04% were reached grade 1 to 12 and only 2.04% were above grade 12. With respect to the specific characteristics of food security and food insecurity households, educational level was hypothesized to have a negative impact on the state of food security, in such a way that households having education helps in promoting awareness on the possible advantages of modernizing agriculture through technological inputs and by diversifying household incomes, which in turn enhance household's supply. Households led by (60.21%) illiterate heads are less likely to understand modern farming technologies provided to them through any media like extension workers, radio and others than literate household heads.



Figure 4: Distribution of household heads by educational level (%)



Source: Field work (2014)

- 4. Farm land size (LSIZE):** Land holding in rural context plays an important determinant factor to influence the types and size of crops produced and the availability of pasture land that, in turn, determines number of livestock reared (Degefa, 2002). Therefore, the size of farmland has vital role in households' food security. Moreover, the availability of pasture land is an important factor for livestock rearing. Therefore, under subsistence agriculture, livestock holding size is expected to play a significant role in influencing farm households' food security. Thus, the discussion of one of the basic resources particularly farm land, farmers and its contribution to household food security is given below.

The average land size in the study areas, according to the information obtained from the Woreda Agriculture and Rural Development Office is 0.5 hectare. However, agricultural land size in the study area may vary depending on the economic status of households. For instance, those economically strong households who are able to access land in different ways such as through rent are able to own up to eight timad or 2 hectares of land. On the other hand, poor households own only half timad of land while medium level farmers own between 2 to 3 timad of land.

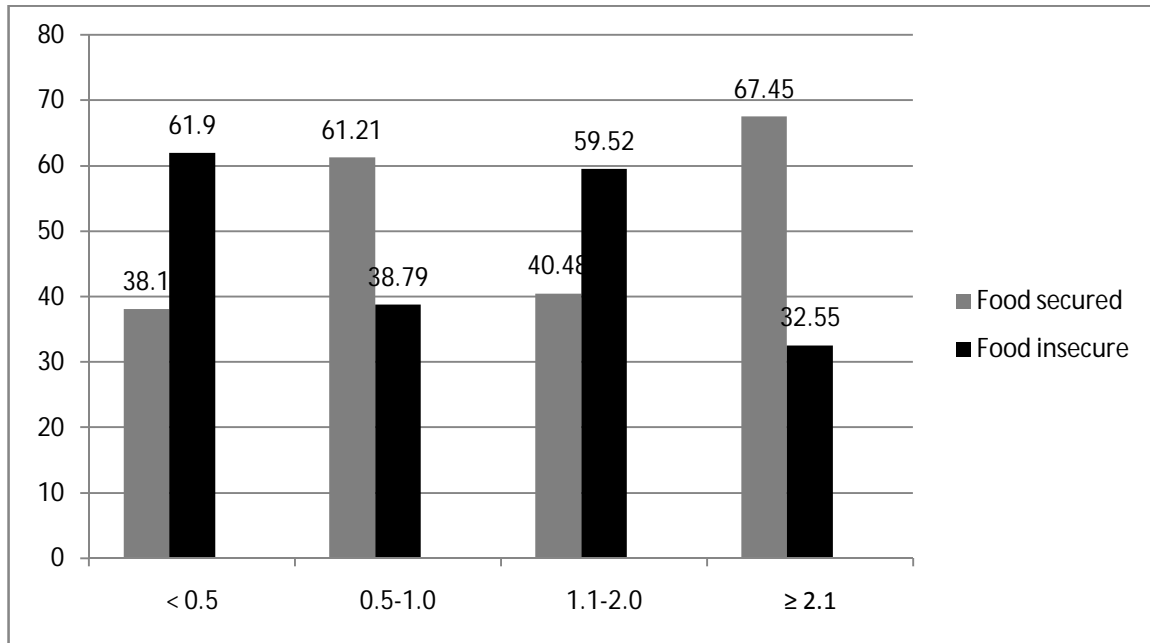
The survey result shows that about 59.2% of the respondents have a land size of 1-hectare or less where 28% had relatively higher size, which ranged between 1 and 2 hectare. On the other hand, only 12.8% of sample farmers had more than 2-hectares of land. It was observed that 61.21% of the foods secure households and 38.79% of food insecure households own 0.5 to 1-heactare of land. In other words, the proportion of food insecurity is higher among households with farm land size less than sample mean (61.9%), i.e., 0.5 hectare.

During the key informant discussion with the Woreda Agriculture and Rural Development Office and Food Security Desk Experts, it was also noted that land in the study sites is becoming more and more fragmented and scarce due to growing population size and population densities as fertility rate of women in productive age group is very high. Hence, there is increasing trend of land division among household members as new grown- ups in a family demand share of their family's land which makes individuals' possession of land very small. As a result, farm land size is decreasing from year to year.

Small land holding in the study area has discouraged many farm households to use crop rotation and fallowing and different agricultural inputs to improve the soil fertility. Therefore, ploughing hill sides and continuous use of land with limited soil conservation practices resulted in degradation of soil in many areas. Hence, declining land size and poor land quality have worsened the condition of declining crop production and land productivity in the study area which indirectly affects the availability of food crops in many households.

Small land holdings also impact the food security of households as farm households face shortage of land to grow more types of crops to ensure the availability of grain at different periods of a year. Besides, coupled with poor soil fertility and limited use of agricultural inputs, the production obtained from such small size farmland would be very limited which affects the potential of many farm households to fulfill their own food requirements.

Figure 5: Distribution of household heads by farm land size (%)



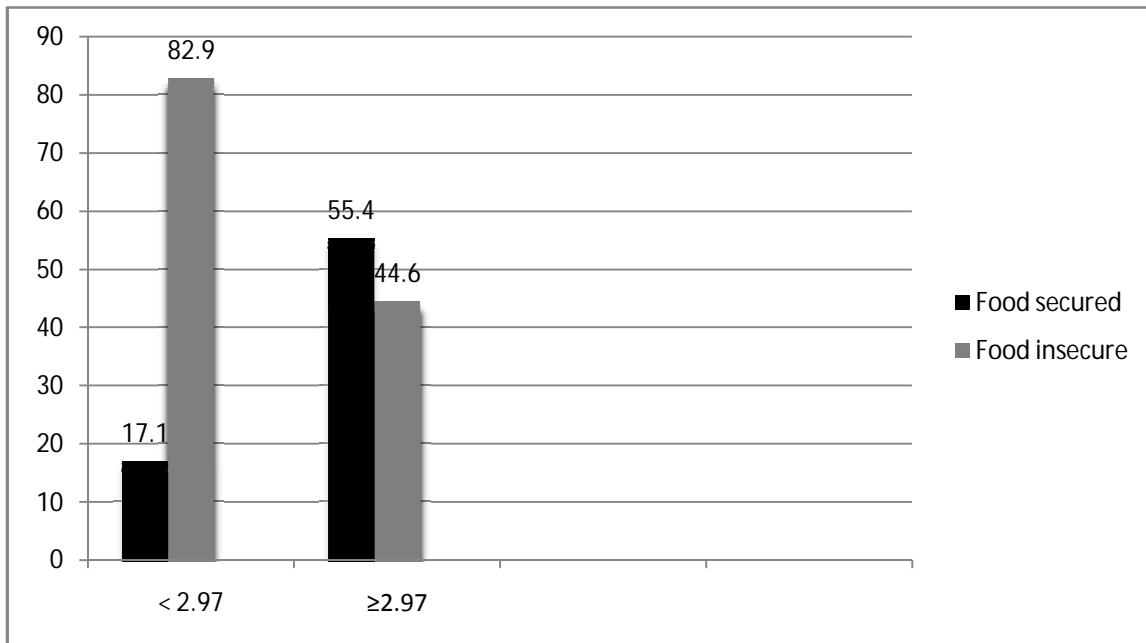
Source: Field work (2014)

**5. Livestock holding (TLU):** The study area is characterized by mixed farming systems in which both crop and livestock production provides income to households. Virtually, all farmers reported ownership of livestock to fulfill several purposes: An output function (subsistence, income and nutrition), an input function (crop inputs and farm integration), soil fertility management, raw material for industry, saving fuel, social functions and employment. In addition to these, livestock are used as assets and security for the rural peasants and are used as the most important insurance/collateral to get loan. Besides, livestock are considered as a means of saving and means of coping mechanism during crop failure and other calamities. Therefore, livestock can serve as a vehicle for improving food security and better livelihood, and contributes significantly to agricultural and rural development.

The survey result shows that the food secure group of households own larger average size of livestock (55.4 %) in terms of total TLU/AE as compared to food insecure group (44.6%). Hence, of the food insecure households, 82.9% have smaller tropical livestock unit (less than the sample average 2.97 TLU). Larger farms are in a better position to raise animals because

livestock feeds produced from larger farmland are normally sufficient, while feed produced from small farms are insufficient. The result revealed that there was significant difference between the two groups in terms of the number of livestock owned which is statistically significant at 1% probability level.

Figure 6: Distribution of household heads by livestock size (%)



Source: Field work (2014)

**6. Number of oxen ownership (OXEN):** Oxen ownership is also an important variable in the study areas that almost entirely rely on traditional farming methods, thereby significantly affecting household's crop production. Due to high shortage of drinking water and grazing land and animal feeds in the study area the respondents underlined the problem of raising livestock in general and oxen particularly. The study showed that households who owned an average of 1.9 oxen were the food secured households and households who owned 1.1 oxen were food insecure. The proportion of food insecurity is higher among households with oxen number smaller than sample mean (42.25%). The result revealed that there was significant difference between the two groups in terms of the number of oxen owned which is statistically significant at 1% probability level.

- 7. Off-farm income (OFF-FARM):** Participation in off-farm income generating activities was measured by whether or not a household head involved in diversified income sources such as selling firewood, working on farms as daily laborers and running petty or small trade. Households who did not engage in off-farm activities are more likely to face food deficit if farm income is not enough. Hence, the survey found out that the proportion of food insecure households is higher among households who did not participate in off-farm income earning activities (82.2%). In light of this, the statistical analysis showed significance difference at 1% probability level between food secure and food insecure farmers.
- 8. Food aid (AID):** In 2003, the Ethiopian government launched a “Food Security Program (FSP)” aimed at shifting households out of the emergency relief system while also enabling them to ‘graduate’ to sustainable food security (FDRE, 2003). As part of the Food Security Program, the government started the productive safety net program (PSNP) in 2005 and scaled up significantly in 2006 to assist 10% of the total population (MoARD, 2009). The program is targeted to those 8 regions and 262 Woredas are identified as chronically food insecure. The beneficiaries of the program are often fail to produce enough even at times of normal rains in the country. In Mekan Wereda, 24 Kebeles are now using the PSNP and the study areas are one of the user. The respondents were asked their attitude about food aid and hence, the proportion of food insecure households is higher among households who have a good attitude and users of the food aid (77%). In light of this, the statistical analysis showed significance difference at 1% probability level between food secure and food insecure farmers. According to Meskan Wereda Agricultural Bureau report, the food insecure household can gain 85 Birr only for himself/ herself. For instance, if the household has 5 family members including him/her, he/she can get a total of 425 Birr per month. This survey finds out that the average family size of the study areas are 4.75 and hence, the mean amount of food aid received by the households was 403.75 Birr per month.
- 9. Use of fertilizer (FETILZR):** Before the introduction of chemical fertilizer in the study area, farmers had been using rotation of cereals with legumes, green manure and fallowing to maintain and improve soil fertility. As land becomes scarcer, these traditional methods of maintain soil fertility are gradually diminishing. Accordingly, about 69% of the sampled

farmers reported that they used chemical fertilizer. The difference between the food secure and food insecure farmers in terms of using chemical fertilizer is significant at 1% probability level as the Chi-square analysis showed the association between food security and fertilizer use. Therefore, the hypothesis that food security and fertilizer use is positively associated is maintained.

The primary reason for households for not using these inputs as the survey results explain that there is lack of financial capital due to high price of inputs. Lack of access to these crucial agricultural inputs, the absence of rural credit giving financial institutions in those kebeles, and fear of debt by many farm households to take loan from individuals were the major constraints. In addition to this, small landholding and uncertainty of rainfall (especially of moisture without which effective utilization of inputs is hindered) in the study kebeles has discouraged households not to use these agricultural inputs. For these reasons the productivity of land is decreasing from time to time as the soil depletes its fertility and nutrients. Key informants of female-headed households also noted that they are unable to use animal manure instead of fertilizers as there is critical shortage of feed for domestic animals and preparing compost requires skill and labor.

The following table shows the relationship of each predictor variable and household food security status:-

Table 2. Relationship between selected variables and household food security status

<b>Variables</b>	<b>No.</b>	<b>Total (%) N=120</b>	<b>Food secure (%) N=18</b>	<b>Food insecure (%) N=102</b>	<b>Pearson Chi-square</b>	<b>LR</b>	<b>df</b>
<b>AGE</b>							
18-30	9.45	7.87	45.4	54.6	10.772 (0.001)*	10.682 (0.001)	3
31-40	25.64	21.37	55	45			
41-60	60.36	50.30	54.4	46.6			
>60	24.55	20.46	57.6	42.4			
<b>SEX</b>							
Female	41	34.12	24.39	75.61	1.437	1.758	1

Male	79	65.58	15.19	84.81	(0.132)	(0.12)	
<b>FSIZE</b>							
<3.0	10.47	8.73	31.63	68.37			
3.00-5.0	16.03	13.36	61.07	38.93	36.386	34.538	3
5.1-7.5	78.07	65.06	5.72	94.28	(0.000)*	(0.000)	
>7.5	15.43	12.08	2.8	97.20			
<b>EDUC</b>							
Illiterate	72.72	60.60	39.79	60.21			
Read and write	28.20	23.50	61.38	38.62			
1-6	11.76	9.80	55.27	44.73	0.215	0.215	4
7-12	5.18	4.40	71.02	28.98	(0.375)	(0.37)	
>12	2.04	1.70	86.47	17.53			
<b>TLU</b>							
<2.97	42.85	35.71	82.90	17.10	18.963	18.657	1
>2.97	77.15	64.29	44.60	55.40	(0.000)*	(0.000)	
<b>LSIZE</b>							
<0.5	16.80	14	38.1	61.90			
0.5-1.0	54.24	45.2	61.21	38.79	19.758	18.895	3
1.01-2.0	33.60	28	40.48	59.52	(0.000)*	(0.000)	
≥2.1	15.36	12.8	67.45	32.55			
<b>AID</b>							
Good	73.2	87.84	23	77	7.619	7.364	1
Not good	26.8	32.16	48.2	51.8	(0.001)*	(0.001)	
<b>OXEN</b>							
Own ox	77.88	64.90	68	32	9.516	9.199	1
No ox	42.12	35.10	38.8	61.2	(0.000)*	(0.000)	
<b>FETILIZER</b>							
Use	82.8	69	59.57	40.43	47.13	45.72	1

Do not use	37.2	31	26.88	73.12	(0.000) *	(0.000)	
OFFFARM							
Participated	98.28	81.90	19.80	82.2	36.489	34.691	1
Not - participated	21.72	18.10	82.80	17.2	(0.000)*	(0.000)	

\*Significant (p< 5%)

The proportion of food secure and food insecure households with respect to the selected predictor variables is depicted in Table 2. Considering the coefficient of Pearson Chi-square, the major variables that determine household food security were age of the household head, family size, number of livestock (TLU), farmland size, food aid, use of fertilizer by the household, oxen ownership and off-farm income participation.

#### 4.4. Descriptive analysis result

The group statistics of the selected variables that influence the food security status in the study area is described as follows.

Table 3. Group statistics of selected predictor variables that influence food security status

Variables	Household Food Security Status			
	Food secure (N =18 )		Food insecure (N =102 )	
	Mean (X)	Standard deviation	Mean (X)	Standard deviation
Farm land size (hectare)	0.85	0.31	0.15	0.06
Family size (number)	3.93	1.41	5.57	1.99
Age of the household (years)	52.01	14.17	49.50	14.89
Annual yield (Kilogram)	892.17	372.03	308.52	137.53
Livestock (TLU)	4.32	1.59	1.62	0.59



Annual Income (Birr)	3951.89	861.15	2474.21	696.86
Oxen ownership (number)	1.9	0.69	1.1	0.40

Data in Table 3 shows that the mean farm size per household is 0.85 hectare for food secure and 0.15 hectare for food insecure. An average of 3.93 persons lives permanently in a household of food secure and 5.57 persons in the household of food insecure. The average age of food secure household was 52.01, whereas that of food insecure households was 49.50 years. During the period under study, food secure households produced, on average, 892.17 kilogram cereals with standard deviation of 372.03 kilogram while food insecure households produced 308.52 kilogram with standard deviation of 137.53 kilogram. Food secure households have 4.32 tropical livestock unit (TLU) on average with a standard deviation of 1.59, while food insecure households have 1.62 TLU with a standard deviation of 0.59. The average annual income of food secure and food insecure households was 3,104.84 and 2,621.63 Birr, respectively. The study also find out that the average number of oxen of a food secure household is a 1.9 with a standard deviation of 0.69 and the food insecure households have an average number of oxen 1.1 with a standard deviation of 0.40.

From the group statistics it can be observed that the food secure households have relatively greater averages on age of head of household, annual yield, farm land size, livestock number, annual income and number of oxen than their counter part households. On the other hand, the food insecure households have greater averages of family size.

#### **4.5. Econometric model analysis result**

In this section, the logistic regression model is first specified. The model is then applied, focusing on food security (food secure and food insecure households).

The main purpose of this section is to specify a logistic regression model fitted to indentify the potential variables affecting household food insecurity in the study area. The variables described are used to estimate the logistic regression model. Using the household food security status as

dependent variable where by a value of 1 is given to households belonging to food secure farm households group and 0 for the food insecure farm households group. Accordingly, the model uses 10 explanatory variables and the model was estimated by the following maximum likelihood estimation procedure. The measurement of goodness of fit of the model shows that the model fit the data well.

The likelihood ratio test statistic exceeds the chi-square critical value of degree of freedom at 5% significance level. So the hypothesis that all the coefficients except the intercept are equal to 0 is rejected. The value of Pearson chi-square test shows an overall goodness of fit at less than 10% probability level. Moreover, the logistic regression model correctly predicted (84%) of the sample cases, (88.9%) as food secure and (96.4%) as food insecure. Hence, the model parameter estimates best fitted.

The results of the logistic regression model estimates indicates that out of the 10 factors included, 8 variables were found to have a significant influence on the probability of being food secure at less than 10% probability level. The variables considered were age of the households, family size, number of livestock owned, number of oxen, farm land size, use of fertilizer, off-farm income per AE and farm credit. The remaining 2 of the 10 explanatory variables were found to have no significant influence on the probability of being food secured. The significant explanatory variables which have effect on food security status of the farm households are discussed below.

Table 4. Summary of results for parameters of the logit model for sampled households in the study area, 2013/14 cropping season

Variables	Estimated Coefficient	Odds Ratio	Significance Level
Constant	13.219		0.006
Age	0.201	0.801	0.030**
Sex	-0.569	0.388	0.143
Family size	-0.960	0.383	0.001***
EDUC	-0.244	0.784	0.428
TLU	0.296	1.344	0.001***

Oxen	2.102	7.149	0.008***
Farm land size	0.777	2.174	0.059*
Fertilizer	0.966	2.6270	0.028**
Off-farm income	0.002	1.002	0.071*
<u>Farm Credit</u>	<u>0.203</u>	<u>0.550</u>	<u>0.049**</u>

\*--Significant at 10 % level of significance

\*\*-- Significant at 5 % level of significance

\*\*\*-- Significant at 1 % level of significance

**Age of household head:** This variable affects food security status positively and significantly at 5 % probability level in the study area. The positive relationship implies that when household heads get older, they are expected to have stable economy in farming. Moreover, older household heads are expected to have better access to land than younger heads, because younger men either have to wait for land redistribution, or have to share land with their families. If all other things are held constant, the odds ratio of 0.60 for household age size implies that, the odds ratio in favor of being food secure increases by a factor of 0.60 as household age increase by one year. This result confirms with Frehiwot (2007) and Ojogho (2010) findings.

**Family size:** Among the important demographic variables, family size is to be highly significant in determining the probability of farm households' food security in the study area. This variable is negatively associated with the food security status and significant at probability level of 1%. This negative relationship indicates that the odds ratio in favor of the probability of being food secure decreases as family size increases. If all other things are held constant, the odds ratio of 0.38 for family size implies that, the odds ratio in favor of being food secure decreases by a factor of 0.38 as family size increase by one person. The farm household with large family size, having children of non-productive age, could face the probability of food insecurity because of high dependency ratio than farm households with small family size. Therefore, the hypothesis that family size with high dependency ratio negatively affects the probability of households to be food insecure is confirmed. This result is in conformity with the findings of Frehiwot (2007) and Abebaw (2003).

**Livestock size:** livestock are an important source of income, food and draft power for crop cultivation. Livestock is positively and significantly associated with the probability of being food secure in the study area. This indicates that households with more livestock produce more milk, milk products and meat for direct consumption and owners could be more food secured. Besides, this enables the farm households to have better chance to earn more income from livestock production which enables them by increasing purchasing power of food during food shortage and could invest in purchasing of farm inputs that increase food production, and able ensuring household food security. Hence, this empirical finding support that larger household holding is important source of income in explaining the probability of being food secure in the study area. The result indicates that, if all other things are held constant, the odds ratio of 1.34 for livestock holding size implies that, the odds ratio in favor of being food secure increases by a factor of 1.34 as TLU increases by one TLU.

**Number of oxen owned:** oxen are among the most important factor of production and hence, determine the household food security status. This variable is significant at a probability of 10% and has positive association with household food security. As hypothesized, this variable affects household's food security. The more the number of oxen available to household, the larger is the probability of being food secured. The positive significance of this variable indicates the contribution of this resource towards ensuring food security. The interpretation of the result indicates that, if all other things are held constant, the odds ratio of 7.15 for the farm oxen household holding size implies that, the odds ratio in favor of being food secure increases by a factor of 7.15 as the farm oxen household holding size increases by one hectare.

**Farm land size:** Farm land size, which is significant at 10% probability level, has positive influence on the probability of farm households' in the study area. It implies that the probability of food security increases with cultivated farm size. This agrees the hypothesis that farmers who have larger farm land holding would be less food insecure than those with smaller land size, due to the fact that, larger farmers are associated with higher possibility to produce more food. With greater wealth and income which increases availability of capital that could increase the probability of investment in purchase of farm inputs which increases food production and hence, ensuring food security of farm households. The interpretation of the result indicates that, if all other things are held constant, the odds ratio of 2.17 for the farm land holding size implies that,

the odds ratio in favor of being food secure increases by a factor of 2.17 as the farm land holding size increases by one.

**Use of chemical fertilizer:** this variable is found to have positive influence on the food security status at probability level of 1%. This means that those farmers who have access to fertilizer use are more likely to be food secure than those who have no access to fertilizer use. The result indicate that, other factors kept constant, the odd ratio in favor of being food secure increases by a factor of 2.91 as farm households fertilizer use increases by one unit.

**Off-farm income per AE:** It represents the amount of income earned in cash or in kind during the year. In the study areas, where the farmers face crop failure and sales of livestock and livestock product is inadequate, income earned from off-farm activities is an important means of acquiring food. Accordingly, in the study area, the success of farm households and their family members in coping with food insecurity is highly determined by their ability to get access to off farm job opportunities. The result suggests that households engaged in off farm activities are endowed with additional income and less likely to be food insecure. Consistent with the hypothesis, off farm income is positively and significantly associated with farm households at a probability level of 10%. The probabilities of farm households to be food secure increases income by a factor of 1.00 as the farm households obtain more unit of off-farm income per AE. The econometric result gives important clues regarding variables, which should be considered and given emphasis during interventions in order to overcome the problem of food insecurity in the study area.

**Farm credit:** credit is important source of investment on activities that generate income for farm households. The households can purchase agricultural inputs like improved seeds, fertilizer, and livestock for resale after fattening. Farm households who have access to credit could increase their production to escape food shortage. The logit model analysis revealed that credit has a significant positive association with food security status at a probability level of 1%. This in agreement with the prior expectation about the impact of the differential access to credit service. This is because farm households who have the opportunity of accessing farm credit would build their capacity to produce more through purchasing of agricultural inputs. The households with more access to farm credits have the possibility to produce the probability of being vulnerable to

food insecure. The odds ratio in favor of food secure increases, other things remain constant, by a factor of 0.55 as far households get access to farm credit.

#### **4.6. Household Coping strategies**

Households pursue different coping strategies for food shortages. However, the types of strategies used at the initial and later stages of food shortages are different. Various researchers identified different coping strategies to maintain the food shortage. These include labor employment opportunities including migration, sales of productive assets, remittances from the relatives who lives in elsewhere, diversification of crop and animal products can be mentioned as some of the coping strategies that mainly farm households practiced (Debebe, 1995).

Respondents were asked to list coping strategies they pursue at times of food shortage. Accordingly, they identified different coping mechanisms such as limiting size and frequency of food, borrowing and gifts from relatives and friends, selling of livestock, selling of firewood, off-farm income, cash for work and relief assistance as the main coping strategies. On the other hand, in the later stages of food shortage, households mainly adopt strategies such as asset sales and farm land rental. However, other strategies which are pursued at the early stages of food shortages such as off-farm income, sale of firewood, loans and gifts are also simultaneously used as coping-up mechanism. Seasonal migration is considered as an option in times of critical food shortages.

The survey result revealed that about 59% of food insecure farm households engaged in off-farm jobs. Even though there was limited access to off-farm work opportunity in the study areas, rural poor farmers work in farmers for wage earned in kind or cash. Another important coping mechanism considered by farmers was borrowing cash or grain from others. This was practiced by 62% of food insecure farm households.

Livestock, besides their complementary relationship with crop production, provide hedging against risks of food insecurity. As a result, when food produced is fully consumed and/ or no cash reserve is available to purchase more out of it, animal products and live animals are sold as ways of getting access to cash income and to buy food for the household. Accordingly, about

54.8% of the food insecure households were involved in the sales of animals (mostly small ruminants) to acquire food whenever there is short fall in food supply. Sales of animals were common for the two groups and this shows that the farm households keep animals as principal assets to manage the shortage. Sales of animals to purchase food grains during supply shortage have considerable effects on farmers' economy mainly because of sharp decline in livestock prices.

The proportion of food insecure households who practiced purchasing grains/ food items during food supply shortage were 52%. Reduction of consumption in terms of both the number and of meals per day and amount of food per meal was identified as means of coping for the largest proportion 68% of the food insecure sample households during short supply. About 65% of the food insecure households reported that they overcome food shortage problems by receiving cash for their work participation from government.

Table 5. Major coping-up strategies practices by farmers in the study areas during 2013/14 cropping season

No. Strategies practices by farmers	Food Insecure (%) [N=18]
1. Sales of livestock	54.8
2. Borrowing cash/ grains from others	61.2
3. Reduce the amount of frequency of food intake per day	69.4
4. Purchasing of grains	52.0
5. Sale of fire wood and charcoal	38.0
6. \Cash for work and relief assistance	65.0
7. Involve in off-farm and on-farm jobs	59.0
8. Seasonal migration	12.0
9. Remittance from relatives	4.0
10. Farm land rental	15.0
11. Sales of productive assets	3.5

The survey results further revealed that food insecure households in the study area practices sale of fire wood, cow dung and charcoal, rent out farm land, received gifts and remittances and sold productive assets as coping strategies. These categories were reported and practiced as a last resort by fewer sample respondents. The analysis has different patterns. All farmers were not equally vulnerable to drought or food insecurity, they respond in different ways. Some households implement some coping strategies, after all other options pursued and exhausted. As the food crisis persist, households are increasingly forced in to a greater commitment of resources, just as the households exhaust the strategies that are available in the early stages of food crisis, they begin to dispose key productive assets such as draft oxen and rent out land. Accordingly, 3% of the food insecure farm households sold key productive assets as coping mechanism for food insecurity.

On the other hand, about 15% of the food insecure sample households rent out their land as a coping mechanism in the study area. As drought and crisis persist in the area, finally they decide to out migrate to cope with food supply short fall. About 12% of the food insecure sample households reported seasonal migration within their own areas to their relatives (particularly during months of July and august). With respect to the period of food shortage that the farm households practice these coping mechanisms, more than 86.3 % of the households encountered severe food shortages during the months of March, April and May.

In general, this study shows how the farm households respond to the food shortage and also highlights how most farmers in the study area are vulnerable and how food insecurity is serious. Hence, factors like poor marketing infrastructure, lack of off-farm job opportunities and lack of credit facilities aggravate food insecurity and made households more vulnerable.



## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1. Summary

The study area, Meskan Woreda, is one of the chronically and seasonally food insecure areas of the SNNP Region. The existence of structural, socio-economic, cultural, demographic and other factors underlying the poverty and seasonal food insecurity problem in the study area. Hence, the main objective of this study was to identify the major factors of food insecurity in the rural households of Meskan Woreda, SNNPR State, Ethiopia. For this study, three Kebeles (viz Beresa Dobo Tuto and Semen Shershera) were selected using purposive sampling on the basis of food security status. From three Kebeles selected, 120 households were randomly selected and interviewed. The study used primary data, secondary data and personal observations to collect relevant data. A questionnaire was developed to collect primary farm-level data during February 2013 to May 2014 mainly bio-data and farm characteristics of the farmers and information-related variable on food security of the households. The questionnaire was supported by a literature review. Finally, to facilitate the communication between farmers and enumerators, the structured questionnaire was developed in two versions: English and Amharic (local language).

Following data collection, the data were coded and entered into the SPSS Version 20 computer software package for analysis. The farm household data were analyzed using both descriptive and econometric methods of analysis. Among the econometric method of analysis, logistic regression model was used to determine the major socio-economic factors influencing food security in the study area. In order to determine the current status of household food insecurity, a household total expenditure per adult equivalent was used. A bivariate analysis was also used to investigate the effect of each predictor variable on the household food security status.

In the study area the proportion of food insecure households 102(84.91%) is higher than the food secure 18(15.01%) households in the year during which the data was collected. The mean farm size per household is 0.85 hectare for food secure and 0.15 hectare for food insecure. On average, 3.93 persons live permanently in a household of food secure and 5.57 persons in the household of food insecure. The average age of food secure household was 52.01, whereas that of food insecure households was 49.50 years. During the period under study, food secure

households produced, on average, 892.17 kilogram cereals with standard deviation of 372.03 kilograms while food insecure households produced 308.52 kilograms with standard deviation of 137.53 kilograms. Food secure households have, on average, 4.32 tropical livestock unit (TLU) with a standard deviation of 1.59, while food insecure households have 1.62 TLU with a standard deviation of 0.59. The average annual income of food secure and food insecure households was 3,104.84 and 2,621.63 Birr, respectively. The study also found out that the average number of oxen of a food secure household is 1.9 with a standard deviation of 0.69 and the food insecure households have an average number of oxen 1.1 with a standard deviation of 0.40.

The proportion of food insecurity is higher among households aged from 18-30 years (54.6%) than the food secured household. Family size was hypothesized to have a negative impact on the state of food security when family size is larger than sample mean. The proportion of food insecurity is higher among households with family size larger than sample mean (82.1%). The proportion of food insecurity is higher among households with farm land size less than sample mean (61.9%), i.e., 0.5 hectare. The survey result shows that the food secure group of households own larger average size of livestock (55.4 %) in terms of total TLU/AE as compared to food insecure group (44.6%). Hence, of the food insecure households, 82.9% have smaller tropical livestock unit (less than the sample average 2.97 TLU). Similarly, the study showed that households who owned an average of 1.9 oxen were the food secured households and households who owned 1.1 oxen were food insecure. Hence, the proportion of food insecurity is higher among households with oxen number smaller than sample mean (42.25%). The survey found out that the proportion of food insecure households is higher among households who did not participate in off-farm income earning activities (82.2%). The respondents were asked their attitude about food aid and the result revealed that the proportion of food insecure households is higher among households who have a good attitude and users of the food aid (77%)

The results of the logistic regression model estimates indicated that out of the 10 factors included, 8 variables were found to have a significant influence on the probability of being food secure at less than 10% probability level. The significant explanatory variables which have effect on food security status of the farm households in the study areas were age of the households,

family size, number of livestock owned, number of oxen, farm land size, use of fertilizer, off-farm income per AE and farm credit.

The respondents were also asked to respond to the coping strategy they practiced to adjust the risk of food shortage. Hence, the survey result revealed that about 57.05% of all respondents, 46.5% of food secure and 59% of food insecure farm households engaged in off-farm jobs. Another important coping mechanism considered by farmers was borrowing cash or grain from others. This was practiced by 48% of food secure and 60% of food insecure farm households. Accordingly, about 52.92% of all households, 44.4% of the food secure and 54.8% of the food insecure households were involved in the sales of animals (mostly small ruminants) to acquire food whenever there is short fall in food supply. The proportion of food secure and food insecure households who practiced purchasing grains/ food items during food supply shortage were 24% and 52%, respectively. Reduction of consumption in terms of both the number and of meals per day and amount of food per meal was identified as means of coping for the largest proportion (59.9%) of the respondents, 14% of the food secure and 68% of the food insecure sample households during short supply. About 62.2% of all cases, 8.37% of the food secure and 65% of the food insecure households reported that they overcome food shortage problems by receiving cash for their work participation from government.

The survey result further revealed that food insecure households in the study area practices sale of fire wood, cow dung and charcoal, rent out farm land, received gifts and remittances and sold productive assets as coping strategies. These categories were reported and practiced as a last resort by fewer sample respondents. Accordingly, among the sample households, 3.53% of them (3% of food secure and 3% of the food insecure farm households) sold key productive assets as coping mechanism for food insecurity. On the other hand, about 7% of the foods secure and 15% of the food insecure sample households rent out their land as a coping mechanism in the study area. As drought and crisis persist in the area, finally they decide to out migrate to cope with food supply short fall. About 11.2% of all cases 7% of the food secure and 12% of the food insecure sample households reported seasonal migration within their own areas to their relatives (particularly during months of July and august). With respect to the period of food shortage that the farm households practice these coping mechanisms, more than 86.3 % of the households encountered severe food shortages during the months of March, April and May.

## **5.2. Conclusion**

In the study area, the proportion of food insecure households (84.91%) is higher than the food secure (15.01%) households in the year during which the data was collected. According to descriptive statistics of the sample farm households, the averages of variables such as household size were found higher with food insecure households than the food secure households. On the other hand, the food secure households have relatively greater averages on the farm land size, educational level of the head, number of livestock and number of oxen than food insecure households. In addition, it was found that fertilizer user households were better food secure as compared to their counterpart households. Similarly, it was found out that large family size has high influence in worsening the food insecurity status of households. From this it is possible to conclude that households with greater household size are more likely to be food insecure as compared with households with smaller household size.

Land holding size was also found one of the important factors in ensuring food security to the households. Farmers with greater farm land size showed better food security status than the less endowed households. Having large farm land size is not only essential to produce enough crops but also is a determinant factor for farmers to use new technologies such as fertilizers, improved seeds and so on. But, the land holding in the study area is very low. Similarly, households who own smaller number of livestock is in a more food insecurity situation than those who have larger. Livestock enables the households to be food secure either through the income earned or by direct consumption. But, oxen hold a special place which relates to the amount of land farmers can cultivate. Lack of access to rural credit in turn has limited the potential of many households to engage in various non-agricultural ventures to diversify their income and cope with seasons of food shortages.

Use of agricultural inputs that are used to improve productivity such as improved seeds and fertilizer is limited in the farm households as the utilization of such inputs requires the availability of financial capital. Therefore, given the poor productivity potential of the soil and poor agricultural management practices in the study area, the production obtained from such degraded lands could not sustain the food requirements in many farm households.

With respect to coping strategies, even though, the farm households use various coping mechanisms, they could not meet their family's food requirements as the sustainability of these ventures is constrained by various factors such as limited capital and labor, poor supporting rural infrastructure and uncertain market condition. Besides, the coping strategies that have long been used in the study area are being exhausted due to the persistence of drought, seasonal food shortages and thus poor households with limited asset possession are increasingly becoming dependent on external sources of assistance.

However, the researcher believes that this is not a complete study to come up with solid solution to address the food insecurity situation in the study area. This is because the range of factors and elements that affect food insecurity are complex and multifaceted in nature and not easy to comprehend. Therefore, effort has been made in this study to examine the effect of some demographic and socio-economic factors on household food insecurity.

In general, in order to achieve the farm household's food security, strategies should be designed in a way that would focus on and address the identified determinants as well as other factors that are useful to achieve household food security.

### **5.3. Recommendations**

- ❖ Expansion and strengthening the off-farm and non-farm activities by providing training and credit services can supplement their income and gradually relieve the diminishing landholding size.
- ❖ Food security interventions should integrate family planning, education and awareness raising programs in order to reduce the increasing population pressure on the available scarce resource.
- ❖ Improving the quality of the land through improved soil and nutrient management, promotion of labor-intensive technologies, and creation of labor intensive rural employment opportunities in the short-to-intermediate terms.
- ❖ The production and productivity of the livestock should be improved through the provision of adequate veterinary services, improved water supply point, introduction of artificial insemination services, launching sustainable and effective forage development program, effective marketing for the sale of the live animals and their product.
- ❖ The productivity of major cereal crops should be increased through the use of increased farm inputs such as fertilizers, improved seeds, pesticides, credit service, access to irrigation facilities and post-harvest management.
- ❖ The study indicated that food aid availability over a long period had a negative effect on the attitude of farmers towards work and their own agricultural activities. The implication is that proper targeting and awareness raising efforts should aim at reducing the attitude of dependency on food aid.
- ❖ More intensive research should be undertaken especially on the area of food insecurity problem by considering detail and accurate information on other than the study selected variables that affect food insecurity.

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# ANNEXES

## Annex 1: Formal survey questionnaire on food insecurity

The main objective of this study is to identify the major factors influencing food insecurity in the rural households of Meskan Woreda, Gurage Zone, SNNPR, Ethiopia.

Date at which questionnaire filled \_\_\_\_\_

Name of enumerator \_\_\_\_\_

Signature of the enumerator \_\_\_\_\_

### Farmer's identification

A1: Study Area: Meskan Woreda

A2: Farmer's name: \_\_\_\_\_

A3: Peasant Association (PA): \_\_\_\_\_

A4: Farmer's number: \_\_\_\_\_

A5: Village: \_\_\_\_\_

### Section 1. Household demographic characteristics

1.1. Name of household head \_\_\_\_\_

1.2. Sex of household head: 1=Male, 2=Female

1.3. Marital status: 1=Single, 2=Married, 3= Divorced, 4=Widowed

1.4. Religion: 1=Orthodox, 2= Muslim, 3=Protestant, 4=Other (Specify) \_\_\_\_\_

1.5. Age of household head (in years) \_\_\_\_\_

1.6. Years of farm experience (years): \_\_\_\_\_

1.7. Household size

Description	Male	Female
1.Members between 15 and 60 years old		
2.Members less 15 years old		
3.Members more than 60 years old		
4.Dependents in the household		
5.Full-time farm workers in the household		
6.Part-time worker in the household		

1.8. Education level of household head (mark the correct one)

Illiterate		Secondary (7-12)	
Read and write		Higher education (above 12)	
Elementary (1-6)		Others (Specify)	

1.9. Size of living house (in square meter): -----

## Section 2. Cultivated land owned by household and other related issues

2.1. Farm size (in kert): \_\_\_\_\_

2.2. Major crops the household is growing during 2012/13 cropping year

Crops	Area (kert <sup>1</sup> )	Yield (quintal/kert)	Total production (quintal)
1. Tef			
2. Wheat			
3. maize			
4. sorghum			
5. Enset			
3. Chickpea(Shibra)			
4. Lentils(Misir)			
5. Grass pea (Guya)			
6. Fenugreek(Abish)			
7. Linseed (Teleba)			
8. Oats (Aja)			
9. Other (specify)			

<sup>1</sup>Kert = 0.25 ha

2.3. Do you use modern tools to improve farm practices? 1. Yes 2. No

2.4. If NO, what are the constraints?

2.5. Do you adopt new practices to increase farm productivity? 1. Yes 2.No

- 2.6. If NO, What are the main constraints?
- 2.7. Do you have your own land for cropping and pasture? 1=Yes, 2=No
- 2.8. If YES, how much is the total farm land size in kert: -----
- 2.9. Slope of your land: 1=Plain 2=Hilly 3=Steep
- 2.10. How do you perceive the quality or fertility of your land?  
1=Fertile, 2=Medium Fertile, 3=Less Fertile, 4=Overused, 5=Poor
- 2.11. Do you have land use/tenure/ownership certificate? 1=Yes, 2=No
- 2.12. If yes to 2.11, what is your attitude towards the land use right certificate?  
1=Builds My Confidence, 2=Doesn't Build My Confidence
- 2.13. Have you used any of the following agricultural technologies during November 2012 to November 2013 production season?

Type of agricultural farm inputs	Answer	
	Yes	No
Chemical fertilizer		
Pesticides		
Improved seeds		
Farm credit		
Access to irrigation water		
Others (specify)		

- 2.14. How was the availability of rain on your fields during 2012/13 cropping year?  
1=Enough, 2=Too Much, 3=Too Little, 4= Other \_\_\_\_\_

### Section 3. Livestock Number and related issues

- 3.1. Do you have/own livestock? 1=Yes. 2=No
- 3.2. If yes to 3.1, how many of the following livestock do you have?

Type of livestock Currently owned on farm	Number
Oxen	
Bulls	
Cows	
Heifer	
Calves	
Sheep	
Goats	
Donkeys	
Horses	
Mules	
Chickens	
Camel	
Others	

## Section 4. Estimated income of the farm household

4.1. What employment and income earning opportunities are available in your area?

(You may choose more than one)

1=only own farming (self-employment)

2=own non-farm employment (trading crafts)

3=farm laborer (work on other farms)

4=migration to work in other areas

5=non-farm laborer (work in cities)

6=other (specify) \_\_\_\_\_

4.2. What is the estimated farm income of your household?

Description	Income per month (Birr)	Income per year (Birr)
Income from sale of own produced crops		
Income from livestock and their products		
Income from small-scale irrigation farming		
Income from non-farm activities		
Income from sale of food aid received from FFW activities		
Income from sale of firewood, charcoal, cow dung cake		
Income from off-farm jobs (daily labor, farm labor)		
Income women household activities (tella, areke, tej, kolo, bread selling)		
Remittance from relatives		
Total income		

4.3. During November 2012 to November 2013, did you participate in any off farm income generating activities?

1=Yes,

2=No

4.4. If NO, why don't you participate in any off farm activities?

\_\_\_\_\_

4.5. Do you have access to credit facilities? 1=Yes, 2=No

4.6. If your answer is YES, state the type of credit facility.

1. Commercial bank/ financial institutions
2. Co-operative society
3. Friends/ relatives
4. NGOs Name (s) -----
5. Others (specify)
6. Not applicable

4.7. If your answer is NO, please give reasons for the prevailing situation.

1. Lack of credit facilities
2. Do not require them
3. Have never heard of credit facilities
4. Others (specify)

### Section 5. Household food consumption and related issues

5.1. What were the different sources of food for your family during 2012/13 cropping year?

Food items	Total amount using the local unit of measurement				
	Own production	Received from food for work	Purchased from market	Received from hiring out of labour	Received from food aid or relief
Maize					
Enset					
Wheat					
Barely					
Teff					
Sorghum					
Others					

5.2. Household food consumption during the year 2012/13.

Food items	Total amount of food consumed (using the local unit of measurement)					
	Used for seed	Given out for hiring in labor	Given out for sharing in oxen	Repayment of crop loan	Marketed	Shared with relative
Maize						
Wheat						
Barely						
Teff						
Sorghum						
Others						

5.3. During November 2012 to November 2013, on average how much did you spend per month for the purchase of food and non-food items?

S.N.	Expenditure Item	Estimated expenditure per month (Birr)	Estimated total expenditure per year (Birr)
1	Food & stimulant items • Purchase of cereals, pulses, oil, fruits, vegetables, coffee, tea, chat, sugar, salt		
2	Non-food items • Purchase of farm inputs (fertilizer, seed, pesticide, veterinary drugs)		
	• Clothing, foot wear, gas, candle, firewood, charcoal, medical expenditure, education and school fees for children		
	• Purchase of farm tools and implements		

5.3. What is your attitude towards food aid?

1=Food aid is good,

2=Food is not good

5.4. How do you cope with the food shortage? (Rank)

Seasonal Migration		loans and gifts	
Remittances from family members and relatives who live in elsewhere		Reduce amount of frequency of food intake and meal size per day	
Selling of livestock		farm land rental	
Selling of firewood and charcoal		Off farm employment	
Cash for work and relief assistance		sale of key productive assets	
purchasing of grains		Others (specify)	
borrowing cash/ grains from others			

**Section 6. Other related issues**

6.1. Is there any farmers' cooperative in your area? 1=Yes, 2=No

6.2. Are you a member of farmers' cooperative? 1=Yes, 2=No

6.3. If yes to 6.2, are you benefiting from the services of farmers' cooperative?

1=Yes, 2=No

6.4. What support you need to obtain from government, non-government and private enterprises to be food secured?

1. -----

2. -----

3. -----

Thank you for your cooperation!

Zelalem Fikire

Annex 2: Conversion factor used to estimate Tropical livestock Unit (TLU)

Type of animal	TLU
Cattle	1
Sheep/Goat	0.15
Horse	1
Mule	1.15
Donkey	0.65
Camel	1.45
Poultry	0.005

Source: G. Ramakrishna and Assefa Demeke (2002).

Annex 3: Conversion factor used to calculate adult equivalence scales

Age groups (in years)	Male	Female
0-2	0.40	0.40
3-4	0.48	0.48
5-6	0.56	0.56
7-8	0.64	0.64
9-10	0.76	0.76
11-12	0.80	0.88
13-14	1.00	1.00
15-18	1.20	1.00
19-59	1.00	0.88
60+	0.88	0.72

Source: World Bank (2010)

Annex 4: Caloric content of the food consumed in the study area

Group No.	Food items	Food energy in Kcal per 100 grams portion
<b>1</b>	<b>Cereals</b>	
	<b>Maize</b>	
	White porridge	154.70
	White bread	223.40
	Injera	153.00
	Whole roasted	88.10
	White kitaa	223.4



	<b>wheat</b>	
	Bread	222.00
	Kitaa	222.00
	<b>Teff</b>	
	Injera	358.80
	Porridge	165.40
<b>2</b>	<b>Vegetables</b>	
	Onion	71.30
	Cabbage	40.10
	Tomato	30.70
	Green pepper	46.50
<b>3</b>	<b>Livestock products</b>	
	Milk	73.70
	Meat	212.30
	Egg	295.10
	Cheese	132.40
	Butter	736.40
<b>4</b>	<b>Others</b>	
	Oil	846.40

Source: Ethiopian Health and Nutrition Research Institute (EHNRI, 1998).

Annex 5. Number of rural Households and Family Size who is using the Productive Safety Net Program Meskan Woreda (2013/14)

No	Name of the Kebele	Received by participating in public works						Received without any participation in public works								
		Household			Family Size			Household			Family Size			Household		
		M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
1	Bati Lejano	82	54	136	328	325	653	11	31	42	38	85	123	93	85	17
2	Dida	189	82	271	657	614	1271	40	55	95	103	179	282	229	137	36

3	E/Eseme	72	27	99	220	196	416	20	28	48	53	81	134	92	55	14
4	Eile	84	31	115	319	289	608	11	29	40	59	88	147	95	60	15
5	Yimer 1	169	60	229	509	500	1009	10	36	46	61	103	164	179	96	27
6	Yimer 2	94	39	133	304	291	595	11	12	23	32	30	62	105	51	15
7	Yimer 3	45	13	58	121	109	230	12	22	34	18	55	73	57	35	92
8	Bamo	75	34	109	231	233	464	5	28	33	32	47	79	80	62	14
9	Dobo Tuto	88	18	106	186	229	415	19	7	26	23	65	88	107	25	13
10	Beresa	154	24	178	449	384	833	49	35	104	135	142	277	203	59	26
11	Do/Gola	93	44	137	359	383	742	13	20	33	52	65	117	106	64	17
12	Do/Bati	49	15	64	146	118	264	13	8	21	49	53	102	62	23	85
13	Bati Futo	162	24	186	320	277	597	20	32	52	128	131	259	182	56	23
14	Beche	113	37	150	362	343	705	12	24	36	39	48	87	125	61	18
15	Wejabati	112	45	157	368	316	684	18	32	50	60	55	115	130	77	20
16	Ocha Geneme	152	41	193	367	341	708	21	14	35	69	87	156	173	55	22
17	Debube Shershera	57	31	88	215	236	451	21	42	63	117	164	281	78	73	15
18	Semen Shereshera	147	67	214	502	528	1030	18	22	40	100	87	187	165	89	25
19	Dirama	101	66	167	397	428	825	14	23	47	59	91	150	115	99	21
20	Wita	94	58	152	355	325	680	13	28	41	82	76	158	107	86	19
21	Joly 2/3	239	102	341	631	690	1321	21	44	65	77	150	227	260	146	40
22	Joly 1	8	21	29	105	106	211	8	25	33	43	66	109	16	46	62
23	She/ Mechmena	51	16	67	153	130	283	14	11	25	34	41	75	65	27	92

24	She/Bido	40	16	65	263	271	534	5	12	17	15	28	43	2824	37	281
	Total	2470	974	3444	7867	7662	15529	399	630	1049	1478	2017	3495	5648	1604	722

N.B. M-Male F-Female T-Total

Source: Mekan Wereda Agricultural and Rural Development Bureu (2013/14, unpublished)