

**AN ASSESSMENT OF HOUSEHOLDS' FOOD INSECURITY
IN MESELA WOREDA, WEST HARARGHE ZONE, OROMIA
REGIONAL STATE, ETHIOPIA**

MA THESIS

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ACRONYMS AND ABBREVIATIONS

AE	Adult Equivalent
ARDB	Agriculture and Rural Development Bureau
CSA	Central Statistical Agency
DA	Development Agent
DRM	Disaster Risk Management
DPPB	Disaster Prevention and Preparedness Bureau
FAD	Food Availability Decline
FAO	Food and Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
FED	Food Entitlement Decline
FI	Food Insecurity
FS	Food Security
FSP	Food Security Program
DFID	Department for International Development
HHFIS	Households' Food Insecurity Status
HHFSS	Households' Food Security Status
IFAD	International Fund for Agricultural Development
Kcal	Kilo calorie
MWARDO	Mesela Woreda Agriculture and Rural Development Office
MWDRMO	Mesela Woreda Disaster Risk Management Office
MWFEDO	Mesela Woreda Finance and Economic Development Office
PSNP	Productive Safety Net Program
SPSS	Statistical Package for Social Science
SSA	Sub-Saharan Africa
TLU	Tropical Livestock Unit
USAID	United States Agency for International Development
WFP	World Food Program

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An Assessment of Households' Food Insecurity in Mesela Woreda, West Hararghe Zone,
Oromia Regional State, Ethiopia

ABSTRACT

The study has conducted with the main objective of assessing households' food insecurity in the Mesela Woreda, West Hararghe Zone; Oromia Regional State, Ethiopia. In order to achieve this objective, the primary data pertaining to demographic, economic, socio-cultural, biophysical, institutional, livelihood Strategies and coping mechanisms were collected from 194 randomly selected respondents through personal interview using structured questionnaire administered by 6 enumerators. Furthermore, the study was supplemented by secondary data collected from various sources. The collected data were presented, organized and discussed using both descriptive statistics and econometric analyses. Attempts were made to look in to the specific characteristics of the food secure and food insecure groups using t-test and chi-square tests. Binary Logistic regression model was used to identify the potential variables capable of affecting the food insecurity status in the woreda. In order to measure whether selected sample household is food secure or not, the amounts of calorie available to a household were determined using a modified version of the regional food balance model. The descriptive analysis result revealed that, 179 (92.3%) and 15 (7.7%) of total sample households were found to be food insecure and food secure respectively. Age of the household head, sex of household head, family size, dependency ratio, annual income, number of livestock owned, farm land size, education status of household head, food aid, irrigation, credit use and off farm/Non-farm participation were among the predictor variables included in the data analysis. Moreover, limiting size and frequency of food, borrowing and gifts from relatives and friends, selling of livestock, selling of firewood and relief assistance were identified as the main coping strategies practiced in the study area. Finally, limiting population size, promoting and expanding off-farm income generating activities, improving the livestock production and productivity were recommended.

Keywords: Coping Strategies, Food security, Food insecurity, Household, Mesela woreda

1. INTRODUCTION

1.1. Background of the Study

Food insecurity in its totality continues to be a challenge not only for developing nations, but also for developed worlds (Birara *et.al*, 2015). The difference lies in the magnitude of the problem in terms of its severity and proportion of population affected (Tsegaye, 2009). According to the 2014 report of FAO on State of Food Insecurity in the world, about 805 million of global population were estimated to have been chronically food insecure in the period 2012–2014, of whom 1.8% were inhabitants of developed regions; 34.3% were inhabitants of Southern Asia; 26.6% were inhabitants of Sub-Saharan Africa; 20% were inhabitants of Eastern Asia; 7.9% were inhabitants of South Eastern Asia; 4.6% were inhabitants of Latin America and Caribbean; 2.3% were inhabitants of Western Asia; 1.6% were inhabitants of Northern Africa; 0.7% were inhabitants of Caucasus and Central Asia while 0.2% were inhabitants of Oceania (FAO, 2014).

Ethiopia is the second most populous country in Africa behind only Nigeria, with an estimated population of 96.5 million by 2014 (World Population Review, 2015). According to 2007 census report, the population is growing at an average rate of 2.6% per annum (CSA, 2008). It is estimated that about 82% of its inhabitants live in the rural areas with insufficient assets to produce and purchase food (FAO, 2014). Agriculture remains the dominant economic sector contributing 40.2% of the GDP (FDRE, 2015). However, the Ethiopian agriculture is largely rain-fed and thus highly vulnerable to the vagaries of the weather. Extreme dependence on rain-fed agriculture and recurrent occurrence of drought has been a major immediate cause of food insecurity in Ethiopia (Ephrem, 2015). Furthermore, the agricultural sector, which is the backbone of the Ethiopian economy, has low performance in terms of feeding the country's population (Anderson and Elisabeth, 2015). Food insecurity is a chronic issue as many families are unable to buy or grow enough food to feed themselves, and so need food aid each year to survive (*ibid*).

Ethiopia ranking 86 among 109 countries and ranking number one in Sub-Sahara region with total scores of 38.5 and as nearly 33 million people (more than 35% of its total population) are suffering from food insecurity (FAO, 2014). Another report by UNICEF (2014) also prevailed that about 10% of Ethiopian citizens are chronically food insecure and this figure rises to more than 15% during frequent drought years; 2.7 million people would require emergency food assistance in 2014. Similarly, the 2017 Humanitarian Requirement Document (HRD) out by Government of Ethiopia revealed that the emergency food assistance and fund requirement was increased following the El-Nino related drought in 2015 and 2016 (USAID, 2017).

Food insecurity in Ethiopia becomes challenging due to its long standing conservative farming system, land degradation, continuous drought and erratic rainfall, population pressure, Poor infrastructure facility and low level of off-farm/non-farm activities (FAO, 2010). On the other sides, the majority of Ethiopians confronts similar challenges in securing sufficient food, but given the topographic and biophysical variation throughout Ethiopia, seasonal undernourishment varies across geographic space and time (Anderson and Elisabeth, 2015). In general the overall food security is deteriorating in eastern parts of the country (Birara *et al.*, 2015). As the report of WFP (2014) demonstrated favorable food security condition prevails in most parts; however, over 7.1 million people in North Eastern Amhara, Eastern Tigray, and Eastern Oromia were estimated to live in conditions of food crisis (WFP, 2014).

Similar to other food insecure areas of the country, food security situation becoming volatile in drought affected parts of the Oromia region, where the request for relief food assistance has been increased (USAID, 2016). Accordingly, the deteriorating food security situation is prevailed in Arsi, West and East Hararghe Zones of Oromia Region (UNICEF, 2014). According to the 2010 DPPB half year report on Oromia region food security situation, the majority of food insecure households were live in rural areas and they are landless and poor without assets to produce, hold very small and fragmented land, and female-headed households, hold large family size, dislocated pastoral members, drought and pest affected households.

Likewise, West Hararghe, which lies in the second drought prone belt, is one of the most affected zones by drought and food deficit in the region (USAID, 2016). According to Tesfaye (2003) study about 53% of the population from this zone is food insecure and live on degraded land with unreliable rainfall. In addition to this, the USAID food security view report of

2016 shows the majority of the rural population in West Hararghe zone lives in poor socio-economic conditions with inadequate access to basic services and infrastructure and they are almost all totally dependent on rain-fed agriculture for their livelihood income. And there have been very few years without famine and relief distribution since the 1970's even during moderately dry or non-drought years (Fekede *et al.*, 2015). This means there is critical food shortage every year in west Hararghe zone. Moreover, the 2016 annual report of Agriculture and Rural Development Office of West Hararghe Zone shows colder than usual temperature between November and January caused frost which severely affected more than 4857 hectares of land covered with *khat* and other perennial. Consequently, Western Hararghe Zone repeatedly faces food shortage despite the privilege of being able to grow and commercialize cash crops like coffee and *khat* (USAID. 2016).

Mesela *Woreda* is believed to be one of the chronically and seasonally food insecure areas of west Hararghe zone (MWARDO, 2015). The productive safety Net program which was started in 2005 by targeting few households (about 10,300 households) and a few rural *kebeles*, currently, reached more than 29,619 households and 25 *kebeles* of the *woreda* (MWARDO, 2015). According to Maxwell *et al.* (2002) if a community or a region is under food insecurity for continuous five years or above, that community is considered to be chronically food insecure. Similar to this, Meskerem (2011) in her study also indicated that food insecurity situations could be worse where the largest numbers of people are safety nets beneficiaries for consecutive three or more years. This research, therefore, was aimed to assess households' food insecurity in Mesela Wored, Western Hararghe Zone Oromia Regional State, Ethiopia.

1.2.Statement of the Problem

Nowadays, food insecurity has gained great attention by policy makers, researchers, governmental and non-governmental organizations and developmental workers (Birara *et al.* 2015). In line with this, food insecurity remains a key issue for government of Ethiopia (WFP, 2014). In order to combat threat of famine and thereby ensure food security for its population, the government has planned a strategy (such as Growth and Transformation Plan (GTP) of (2010-2015), Agriculture sector Policy and Investment Framework (PIF), Food Security Program (FSP) of (2010-2014), and National Nutritional Strategy (NNS) of 2008) on increasing the availability of food grain through significant investments in agricultural technologies, services

and rural infra-structure expansion (Biraraet.al. 2015). However, there are still millions of people who experience extreme hunger in the country (Kebede, 2016). Agriculture is the main livelihood activity inhabitants of Mesela *Woreda* depend on; as a result, failure of crop output makes rural household vulnerable to food insecurity (MWRDO, 2015). In line with this, the 2016 annual reports of DRMO and Woreda agriculture and natural resource development office of Mesela *Woreda* revealed that the study area faces several food insecurity challenges and deteriorating livelihood. According to the 2016 report of DROM; in 2010 year 25,020, in 2015 year 31,324 and in 2016 29,475 households were registered to be victims of food shortage and famine and food aid was provided to sustain their life. Furthermore, from my long experience and as different reports the problem of food insecurity has been challenging the livelihoods of households in the *Mesela Woreda* whose existence is largely dependent on agriculture. However, no study has been found that upholds or denies these views. Moreover, it is impossible to overcome the predicaments of food insecurity by merely wishing it away without understanding the nature of the food insecurity and its entire dimension scientifically (Arega, 2012).

Hence, this study has aimed at assessing households' food insecurity, identifying factors responsible for households' food insecurity and examining how households respond to food insecurity in this small and remote geographical area of the country. This study therefore, aims to fill this gap as it would contribute to already existing literature on food insecurity from such remote and pocket area and it would provide baseline information to policy makers, non-governmental agency, researchers, and other development partners who normally provide support for such households at micro and macro level and it would help any concerned body to adjust additional remedies to problem and it helps those who interested to study on similar issues in the study area.

1.3.Objectives of the Study

The main objective of the study is to assess households' food insecurity in *Mesela Woreda*, West Hararghe Zone; Oromia Regional State, Ethiopia.

The specific objectives of the study are:

- To examine the extent of households' food insecurity status in the study area.
- To identify the causes of food insecurity in the study area.

- To identify local adaptation and coping strategies households use to cope with food insecurity.

1.4. Research Questions

Based on the Objectives of the study and relevant literature, the following research questions were posed.

- What is the food insecurity level of households in the study area?
- What are the leading factors for households' food insecurity in the study area?
- What are the local adaptation and coping strategies pursued at the HH in the study area?

1.5. Scope and Limitations of the Study

The study was conducted to assess households' food insecurity in Mesela *Woreda* of West Hararghe zone. The study covers only one of the seventeenth *Woredas* of Western Hararghe Zone of the Oromia National Regional State. Moreover, the study deals with a limited number of households (i.e. only 194 household heads were selected for this study) and the study was covered only three *Kebeles* of Mesela *Woreda*. The data were collected during December 2016 when the yield obtained by the farmer is relatively good and as a result of budget and other resource limitations the study did not consider other season where the productivity of the farmers are low. Also, as the study considers a onetime cross sectional data further study with more number of sample households and more than one time cross sectional data recommended for further study.

1.6. Significance of the Study

The output of this research is greatly helpful to development practitioners and policy makers to acquire better knowledge to carry out development interventions at the right time and place to decrease vulnerability to food insecurity. This study is also important to all concerned sectors that are going to implement projects that are related to food insecurity in the area, this may include the government, nongovernmental organization and private investors. In generally, the beneficiaries of this study may be the government, nongovernmental organizations, private sectors and the community. The results of this study can also make ready and document at

Woreda level so that it will serve as a reference material for anyone else who want to refer it for further study.

1.7. Definition of Key Terms

Coping strategies: are short term responses made by households to improve the declining situation of households' food (Thomas *et al.*, 2007)

Food insecurity: is a situation in which individuals have neither physical nor economical access to the nourishment they need (FAO, 2012).

Food security: is a situation that exist when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Clay, 2002).

Household: a person or a group of people living in the same compound (fenced or unfenced), answerable to the same household head and sharing a common source of food and/or income (Mbidha, 2011).

Livelihood strategies: are the combinations of activities that people choose to undertake in order to achieve their livelihood goals (Ellis and Allison, 2004)

Mesela Woreda: it is one of the woreda that is found in western Hararghe zone of oromia Regional State, Ethiopia.

1.8. Organization of the Thesis

This thesis is organized in to five chapters. The first chapter has already set out background to the study. The second chapter presents review of related theoretical and empirical literature appropriate to the topic of this research. The third chapter presents the research methodology that includes research design, description of the study area, sampling techniques and sampling size, method of data collection and analysis. The fourth chapter presents results and discussion. The last chapter presents summary and conclusions.

2. LITERATURE REVIEW

2.1. Concept of Food Insecurity

Food insecurity is defined as a condition in which people lack the basic food intake necessary to provide them with the energy and nutrients required for fully productive lives (FAO, 2010). Similarly, Clay (2002) defined food insecurity as a situation in which individuals have neither physical nor economical access to the nourishment they need. Wubishet (2014) in his study also said that 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 is not resilient against shocks (FAO, 2010).

Food insecurity can either be transitory or chronic or continues food insecurity (Devereux, 2006). Chronic food insecurity is a situation that exists when food supplies are persistently insufficient to provide adequate nutrition for all individuals, either by production, barter, purchase, gift, sharing or aid (ibid). Meskerem (2011) in her study also explained chronic food insecurity as a typical symptom of poverty and reflects a long term structural deficit in production and lack of purchasing power. Moreover, according to Ephrem (2015) study result low income groups such as the urban poor, the rural landless, small food deficit farmers, and herders are the most vulnerable to chronic food insecurity. On the other hand Devereux (2006) explained transitory food insecurity as a temporary short fall in food availability/instability in food production or seasonal food shortage as well as catastrophic food short falls caused by economic problems (like a fall in income and increase in food price), natural disaster and war. Thus, according to Devereux (2006) transitory food insecurity is not one time event, rather it is cyclical.

2.2. Measurement of Households' Food Security Status

There are four recommended and most commonly used outcome indicators of household food security (Hoddinott, 2002): (1) Individual intakes, this is a measure of the amount of calories consumed by an individual in a given time period, usually 24 hours. (2) Household caloric

acquisition, this is the amount of calories available for consumption by household members over a defined period of time (3) Dietary diversity, this is the sum of the number of different foods consumed by an individual over a specified time period, and (4) Indices of household coping strategies, this is an index based on how households adapt to the presence or threat of food shortages. Moreover, Dawit *et al.* (2008) review of different literatures provides four approaches for measuring household food security: The first approach is measuring food consumption to estimate calorie intake which uses two methods *i.e.* the disappearance method where the sum total of household's production and purchases overtime are estimated, estimates of the growth or depletion of food stock held overtime is made and the balance is considered as consumed and the second method is the 24 hours recall of food consumption for individual members of a household and analyze each type of food for calorie content which enables also to capture the intra-household consumption differences.

The second approach is anthropometrical measurements, where the level of food security is estimated based on the height for age, weight for age and/or weight for height z-scores. The third approach is measuring indices of coping strategies and the fourth approach is measuring the amount of calories available for consumption by household members over a defined period of time. All these measures are in their descending order in terms of the cost of acquiring the relevant data as well as the quality of the indicator (*ibid*).

2.3. Theories of Food Insecurity

To explain social phenomena, social scientists employ different theories and concept to help facilitate in analyzing experiences. The theories and concepts serve as the guide for conceptualizing social phenomena. This study therefore utilizes different theoretical approaches to understand the complexities of food insecurity and how food insecure households cope with it. The major theories considered here are includes: General Explanations of Food Insecurity, Models of Food Insecurity and Sustainable Livelihood Approach.

2.3.1. The general explanation theory

This theory mainly emphasizes on the impacts of drought, flood, land degradation, inaccessibility to productive resources and population pressure on the performance of household food security status (Devereux, 1993). It results in disruption of agricultural production and attributes the household to decline in food availability (Degefa, 2002). Household food security

situation in rural areas is whether the household can produce sufficient food from own production or sell livestock and purchase food grain of the right quality in the market place (Wubishet, 2014). This implies availability of enough food and the capacity of the household to acquire it determines household food security. Therefore, household food security means the complementarities of food availability and entitlement.

2.3.2. Food availability decline approach

The FAD approach argues that disruption of food production below some minimum requirement by some natural calamity causes famines (Devereux 1993 cited in Arega, 2012). In this regard, early thinkers of food security linked food insecurity to food availability decline. It concentrates on problems of food supply and food insecurity occurs when there is aggregate decline in food supply (Vadala, 2009). Consequently, FAD resulted from two sets of conditions (Atkins and Bowler, 2001).

First, food shortage could occur due to some natural calamities such as crop failure or lack of import and/or food aid distribution. Second, FAD could occur in broader geographical regions where agriculture is only marginally viable even in good years (Ejiga, 2006). According to this approach, people starve because of local, national or regional decline in food availability to the level below the minimum necessary for survival; because of high population pressure and climate change/variability (Arega, 2012). FAD model is directed towards understanding of the main hindrances for an increased agricultural production which, in turn, would lead to decline in food availability (Vadala, 2009). The central argument of the model is that, anything which disturbs food production, such as drought and flood by reducing the availability of food for extended period of time causes famine.

Hence, the first version of FAD approach focuses on population growth. Looking the fastest growth of the Irish population Malthus hypothesized that the limited amount of farmland and high population growth would inevitably lead to hunger, famine and disease. Malthus argued that population growth will lead to constantly increasing demand for food which agriculture, given limited farmland and other natural resources, would eventually be unable to satisfy the food demand of the population. In other words, Malthus proposed that population growth has to be

balanced with food production; failure to do so would force nature to take its own measure by wiping of the “excess” (Vadala, 2009). Nord (2014) assumed that taking fertilizer consumption and irrigation of land being constant, the relationship between population density and aggregate productivity is found to be negative. Shumate (2009) argued that traditional production methods had rarely enhanced by population pressure in Africa, and had led rural people increasingly degrade the natural resources.

The second version of FAD approach focuses on climate change/variability. This is because no natural factors affect the food availability situations more than climate related predicaments. Farmers in many parts of Africa have perceived that there is climatic variability at inter-annual and decadal time scales (Thomas *et al.*, 2007). Climate change is happening and will continue in the future, regardless of what investments in mitigation measures are made (Mertz *et al.*, 2009). This change is rapidly emerging and the world is facing a greater challenge of accelerated human-induced climate change than ever before (Aklilu and Dereje, 2010). The tragedy is that those countries who contributed little to the causes of greenhouse gas emissions are the ones most affected by climate related shocks. Ludi (2009) and Aklilu (2011) for example, indicated that Africa with little contribution to climate change is the hardest hit in climate related shocks.

FAO (2008) and Ludi (2009) disclosed that frequent and extreme weather events such as droughts and increasing irregularities in rainfall patterns have immediate impacts on food security (availability, accessibility and utilization) and human health in many parts of Africa. Aklilu and Dereje (2010) noted that non-climatic factors such as endemic poverty, hunger, prevalence of diseases, conflicts, low levels of infrastructure development and weak governance, complicate the food security situations of Africa. In response to the situations, the local people in many parts of the continent, using their indigenous knowledge have developed coping and adaptive strategies to reduce climate variability and related shocks (Nyonget *al.*, 2007). Nevertheless, because of scarcity of resources, meager skills and capabilities, poor infrastructure, weak institutional structures, the rural poor are not capable to resilience from vulnerability to climate related shocks (Tagel, 2012).

2.3.3. Food entitlement decline approach

The entitlement approach highlight three conceptual categories, thus an endowment set, an entitlement set and entitlement mapping (Nayak, 2000). The endowment set refers to the combination of all those resources that are legally owned by a person conforming to established norms and practices. These include both tangible and intangible assets. Among these assets are lands, equipment, animals, knowledge and skills, labor power, or membership of a particular community (Nayak, 2000). The entitlement set constitute the possible combinations of goods and services that a person can legally obtain by using the resources of his endowment set. The use of the resources to get final goods and services may be either in the form of production, exchange or transfer (ibid). The entitlement mapping, also known as E-mapping, expresses the relationship between endowment set and entitlement set. It is the rate at which the resources of the endowment set can be converted into goods and services included in the entitlement set (ibid).

Sen (1981) cited in Arega 2012, using peasant as a case, contented that, the ability of a peasant to access food is determined by land, labor power and other resources owned, the person's endowment is the combination of all these resources. This endowment can be used in the production of a bundle of food; alternatively, the labor skill can be sold to earn income, which can be used to purchased foodstuff and other commodities. More so, cash crops can be cultivated to generate income which can be used to buy the needed commodities (ibid).

The individual entitlement could be placed into one of these categories. Thus trade-based entitlement, production-based entitlement, own labor entitlement and inheritance and transfer entitlement (Devereux, 2001:19). The trade-based entitlement-here one is entitled to own what one obtains by trading something one owns with a willing party. In production-based entitlement, one is entitled to own what one produces using one's own available resources, or resources hired from willing parties meeting the agreed conditions of trade. About own-labor entitlement, one is entitled to one's own labor power. Regarding to the inheritance and transfer entitlement, one is entitled to own what is willingly given to one by another who legitimately owns that thing (Devereux, 2001).

2.3.4.Sustainable livelihood approach

Sustainable livelihood approach enables to identify and understand a multiple of natural, cultural, social, economic, and political factors that enhance or constrain peoples living situation in general and household food security in particular; and it offers more attention and priority on human environment. It is used to understand the sustainability of the quality of life and food security of the poor and recognizes the complexity, diversity and continuous change of people's activities and their strategies over time. In addition, the approach helps to holistically addresses how context interact with various forms of assets in affecting the livelihoods and strategies that households depend on (Degefa, 2005). Food availability addresses the households' adequate supply of food and is determined by the level of home production, purchase in the market or food transfer (Degefa, 2002).

Food availability can be affected by disruptions of food production due to bio-physical problems (erratic rainfall distribution, recurrent drought, soil erosion, poor soil fertility, crop pest and disease, and livestock disease), poor access to productive resources (farm size, oxen, skill, farm and off-farm income, farm implements, modern farm input utilization) and demographic factors (family size, sex and age of household). Food access is the way in which households acquire available food in different forms that include home production, purchase in the market, borrowing, gifts from relatives/friends, and provisions through relief systems or food aid (Aidoo *et al.*, 2013).

This can be determined by household productive asset (farm size, oxen, skill, farm and off-farm income, farm implements, modern farm input utilization), socio-cultural factors (saving habit and social support) and infrastructural factors (access to road, rural credit, storage facility, extension services, irrigation practice and location of market). Food utilization is the way in which people consume their food (Aidoo *et al.*, 2013). This can be determined by demographic factors (educational level of household), socio-cultural factors (eating habit, food preferences, food rationing, social and religious ceremonies, nutritional knowledge and health status) and infrastructural factors (water supply and health services).

2.4. Major Causes of Households' Food Insecurity

Degefa (2002) in his study conducted in Oromiya region indicates that, though the causes of household food insecurity vary from household to household, the major causes of food insecurity in Ethiopia are closely related to environmental, demographic, economic, social, infrastructural and political factors. Similarly, Meskerem (2011) in her study conducted on food security situation and coping strategies in Girar Jarso *woreda* Oromia Region also categorizes the main causes of food insecurity as environmental, demographic, economic, social, infrastructural, and political dimension in their nature. Generally speaking, the main causes of food insecurity are environmental, demographic, economic, social, infrastructural, and political dimension in their nature. Some of the major factors are explained as follow:

2.4.1. Demographic factors

Dependency ratio which is the ratio between the dependent population (below 15 years and above 15 years) and working age group (between 15 and 60 years old) is a cause for food insecurity (Yenesew, 2015). The dependency ratio in rural Ethiopia is 110 percent which indicates that the presence of high population number with high number of dependent age groups in Ethiopia requires high amount of food but contributes less active force for development and thereby bringing food insecurity (WFP, 2009). The larger the household size (economically inactive) the more implication on food consumption than on labor supply to boost production.

Households who have larger family size or dependents are expected to be less likely to feed their families sufficiently. Because of land and finance to purchase agricultural inputs are very limited, increasing family size tends to exert more pressure on consumption than the labor it contributes to production. Thus a negative correlation between household size and food security is expected (Paddy, 2003). Alem (2007) indicate his study by holding other variables constant a shift to smaller family size (smaller than the sample mean family size) decreases the probability of food insecurity by 63%. Another factor that strongly influences household food security is educational level of the household head. A study by Haile *et al.* (2005) conducted in Koredegaga *Kebele*, Oromia Zone, identified that the educational attainment of farm households heads had a significant influence on food security.

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 (extension workers, radio, etc.) than literate household heads. Moreover as the household heads education level increased their creative skills of productive income generating activities is also increase which leads to better income and food security. Another factor is age of household head. Younger household heads are expected to have relatively poorer experiences of the socio-physical environments and farming than older household heads while older people have relatively richer experiences of the social and physical environments as well as greater experience of farming activities; that is, when household heads get higher age, they are expected to have stable economy in farming (Fekadu, 2008).

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 (Tsegaye, 2009). Sex of the household head also can affect household food security status. Female-headed households are expected to be more food insecure than male-headed households (Yenesew, 2015).

2.4.2.Economic factors

According to Degefa (2002), absence of off-farm incomes, shortage of farm oxen, shortage of modern farm inputs, traditional farm implements and practices were the major economic factors. Similarly according to Amsalu *et al.*(2012) study done in Shashemene Woreda Oromia Region Logit model result showed that total cultivated land , total annual farm income per adult equivalent, total off farm income, and livestock size have positive and significant relationship with food security. A study made in rural Gedeo by Shumate (2009) indicates that the livelihood of rural people in general and household food security in particular are dependent on the ownership of key productive factors including farm, draught animals, breeding cattle, family labor, farm implements, and small livestock.

He argues that the level of ownership of particular productive assets such as draught oxen, breeding cattle and farmland size determine the seasonal or annual production and income of rural households. For instance, the smaller the farmland owned by the household, the smaller the

level of production and the more likely to be food insecure. More land size holding means more cultivation and more possibility of production which in turn increases farm income and improves food security (Tesfaye, 2003). A shift to high yield (larger than the sample mean) and large farm size (larger than the mean farm land size) decrease the probability of household food insecurity by 39% and 42%, respectively (Alem, 2007).

Similarly, a shift to more livestock (larger than the sample mean TLU) decrease the probability of household food insecurity by 38% (Frehiwot, 2007). In other words the probability of household food security increases with the number of livestock (TLU). A TLU is equivalent to 250 kilogram of live weight and refers to total livestock ownership of household head. The smaller the wealth status of the household head or TLU that a household head has, the higher the food insecurity. An increase in the livestock population enables the people to be food secure either the income earned or by direct consumption (Habtamu, 2015).

Oxen ownership is another determinant of the food security status of households. According to Adugna (2008) conducted his study in Boloso Sore *Woreda* Wolayita Zone, shortage of oxen is the most influential cause of food insecurity. Oxen serve as a source of traction in many developing countries, thereby significantly affecting households' crop production. Animal traction power enables households to cultivate greater areas of land and to execute agricultural operations timely (Haile *et al.*, 2005).

2.4.3. Biophysical factors

Biophysical 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 (Amsalu *et al.*, 2012). 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, Haile *et al.* (2005) 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. Various studies 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. The rainfall variability, soil erosion, scanty vegetation cover 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 (Fekede *et al.*, 2015). A study conducted in Ethiopia by Devereux (2000) revealed that a 10% decline in rainfall below its long term average reduces national food production by 4.4%.

2.4.4. Socio-cultural factors

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 (Tsegaye, 2009). In our country Ethiopia gender division of labor due to cultural factors constrain productivity and food security. It is not socially acceptable for women to plough and prepare fields for planting on time for the season; therefore, women had resort to begging neighbors and waiting until everyone else has finished their plowing, otherwise they must pay someone to do it for them (McBriarty, 2011).

Food aid literature suggests that food aid is a short-term solution to food insecurity and does not contribute to asset creation or rehabilitation of beneficiary communities (Zelalem, 2014). In most cases, food aid had a negative effect on the attitudes of farmers towards work and their own agricultural activities. Households who have dependency feeling on food aid are more likely to suspend productive work on their farm plots and spend less time supplying labor to agricultural and non-agricultural activities in preference to aid and were expected to be more food insecure than others (Zelalem, 2014). Oxfam (2004) reported that some households in Tigray and Amhara regions of Ethiopia even depleted their livestock resources in order to become poor and qualify for food aid and households feel that they will be disqualified if they produce food grains or their own livestock. A shift from dependency attitude to self-reliance decreases the probability of food insecurity by 25% (Alem, 2007).

2.4.5. Institutional factors

A number of studies agree that poor infrastructure including roads; schools and health services constrain productivity and thereby bringing food insecurity and dependence on food aid (Zelalem, 2014). Lack of roads and transport result in fewer market opportunities, less influence from outside and added difficulty in acquiring medical treatment or access to information and it seriously affect their attainment of food security (McBriarty, 2011). Access to market indicates that the farther the household is away from the market place the less likely the family is food secure. This is a consequence of lack of information about market prices (Habtamu, 2015).

As indicated in many literatures, inadequate infrastructures and social services development such as road, transportation, communication, electrification, education and health services and agricultural services would be major challenges to sustain the growth of agricultural production and food security (Tsegaye, 2009). 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).

2.5. Households' Responses to Food Insecurity

2.5.1. Coping strategies

Maxwell (1996) cited in Arega (2012) classified household responses to food insecurity into two: Coping strategies and Adaptive strategies. Coping strategies are responses made by households to improve the declining situation of households food security (increasing food supplies through non-sustainable means) while adaptive strategies involve a permanent change in the mix of ways in which food is required, irrespective of the year in question and it refer to long term adjustment (increasing food supplies through sustainable Livelihood framework). There are four types of coping strategies that food insecure households typically use (Bashir, 2010): Changing the diet to include less costly and less preferred alternative foods; Increasing food supplies through non-sustainable means (e.g., borrowing money, consuming seed stocks, begging); Decreasing the number of individuals being fed by the household (i.e., migration); and Rationing available foods by reducing meal size or frequency (ibid).

The most commonly practiced coping strategies during abnormal season include short term dietary change(changing the diet to include less costly and less preferred alternative foods), changing intra household food distribution like skipping adults to feed children (decreasing the number of individuals being fed by the household, Rationing available foods by reducing meal size or frequency(limiting size and frequency of food), borrowing and gifts from relative and friends, mutual support mechanism, selling of livestock and fire wood, cash for work and relief assistance, (e.g., borrowing money, consuming seed stocks, begging); etc.

2.5.2. Adaptive strategies

The commonly used adaptive strategies include risk minimization, food and income diversification mechanism, planting damage resistance crop, cultivating marginal soils, etc. (Maxwell *et al.*, 2002).Coping strategies might be different for different areas as the ability of households to keep its members of the households alive under severe food deficit within the existing social, economic, formal and informal institutions of the society (Abebaw, 2003).A study conducted in three most deprived and poverty stricken regions in the Northern parts of Ghana showed that households use a wide range of mechanisms and communal support networks to cope with the situation which includes collection of wild foods, market purchases, in kind (food) payment, support from relatives and friends, sales from livestock and household valuables, migration and wage labor, reduction in the number of meals served each day, reduction in the portions/ sizes of meals and consumption of less preferred foods (Wilhemina,2008).

Food grain purchase, borrowing grains; migration to other areas; engaged in off farm activities such as collecting fire wood and selling, support from relatives and friends (remittance), change in consumption patterns, obtain food through food for work, consumption of wild plants;consumption of meat from their livestock and reduction of food consumption are coping strategies used by farm households in rural Ethiopia (Eden *et al.*, 2009).

2.5.3. Livelihood strategies

A portfolio of activities and choices that people make to achieve the livelihood goals include agricultural production, off-farm and non-farm employment opportunities. However, most writers agree that the livelihood strategies are dynamic in nature and are changing overtime in

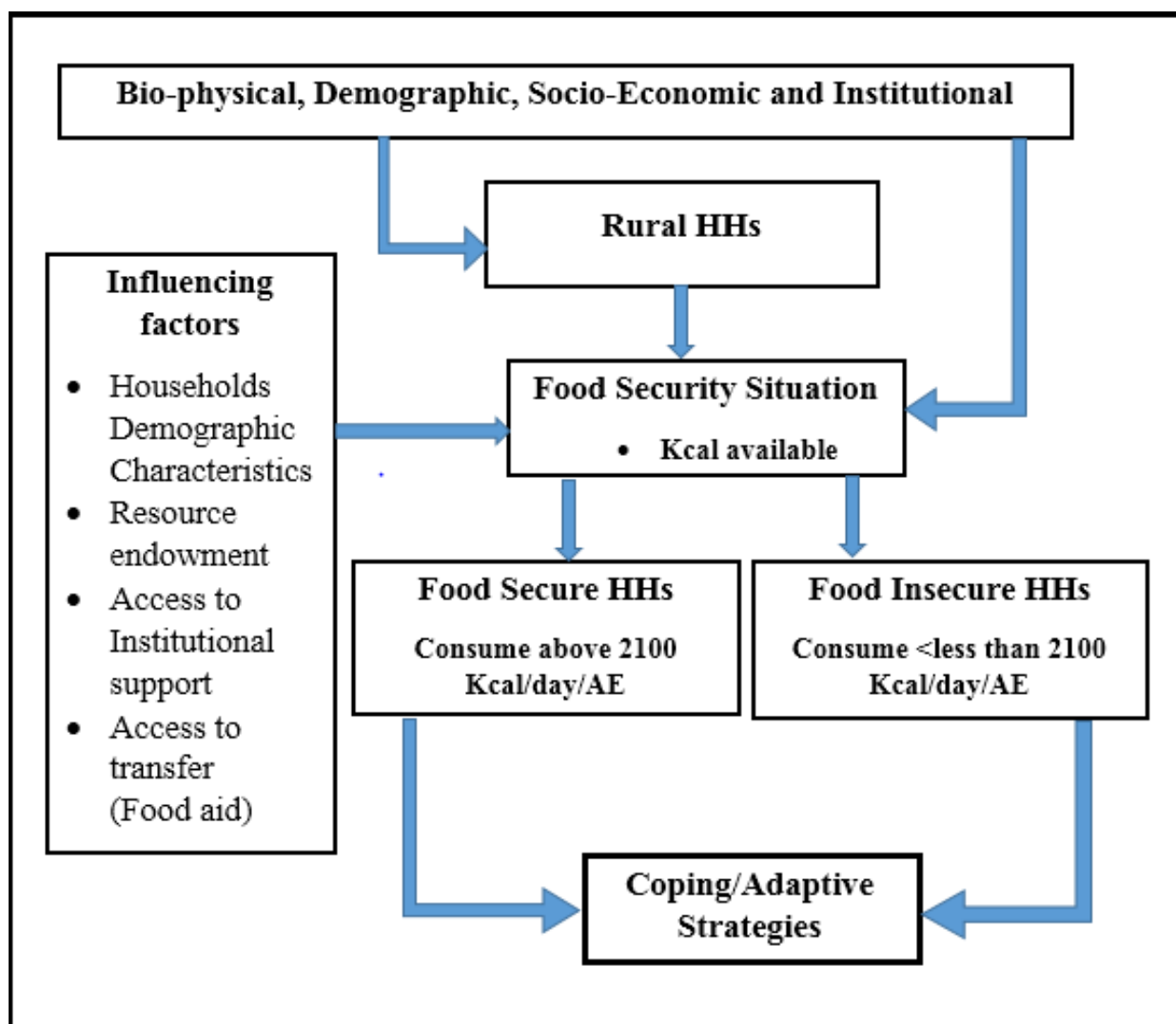
responses to the constraints and opportunities households face (Ellis, 2000). Livelihood strategies are the combination of activities that people choose to undertake in order to achieve their livelihood goals (Ellis and Allison, 2004). In general, the livelihood strategies are grouped in to three categories (ibid). These are on farm, off farm and non-farm activities. Off-farm activities refer to agricultural activities which take place outside the person's own farm (Shumate, 2009). The activities include local daily wage labor at village level or the neighboring areas in return for cash payment or the agricultural work at another person's farm in return for part of the harvest in kind. Natural resource based activities like firewood and charcoal selling are the other type of off-farm activities (ibid). Non-farm activities refer to activities takes place outside the agricultural sector (Degefa, 2005). It includes handicraft activities (weaving, spinning, carpentry, house mudding, poet making, remittance etc), petty trade (grain trade, fruits and vegetables trade), selling of local drinks, trading of small ruminants and cattle, and remittance transfers within and across nations (Arega, 2012). Alem (2007) indicate his study by holding other variables constant a shift to participation on off/non-farm activities decreases the probability of household food insecurity by 66%.

2.6.The Conceptual Framework

It is clear that several factors may affect households' food security status. However, due to the difficulty of getting adequate fund and sufficient time to collect all the required data, this research considers the important variables in the study area. In addition, the relationship generally exists among number of factors, precluding their inclusion in the analysis efforts. Considering this limitation, therefore, those factors considered and defined to exert the largest effect on the household food security status. Based on the objective of the study, the independent variables selected to achieve the ultimate objective of the study are broadly categorized in to biophysical, socio-economic, institutional, demographic, livelihood and coping strategies.

The relationship between HHFIS and independent variables are described in figure 1. Therefore; factors that affect the households' food insecurity status were included in this study. Some of these are biophysical, demographic, socio-economic and institutional factors. The framework emphasized on the relationship of the explanatory variables with HHFIS. However, the relationship of the explanatory variables among themselves was not shown in the diagram. This

does not mean that there is no relationship between explanatory variables, but simply to concentrate on their relationship with the HHFIS rather than relationship among themselves. The conceptual framework described below incorporates these factors to assess their impact on household food insecurity status.



Source: DFID, 2003 (with some modification)

Figure 1: Conceptual frame work of the study

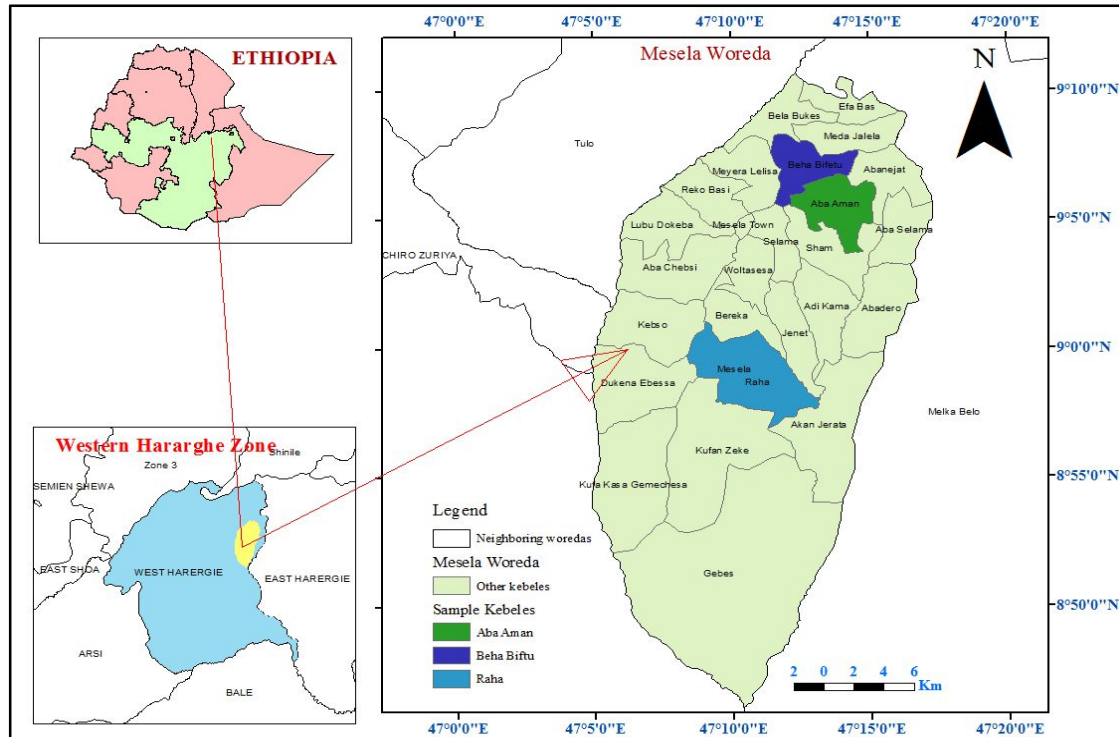
3. RESEARCH METHODOLOGY

This section includes several components such as description of study area, research design, research strategy and methods of data collection, sample size and sampling techniques, types and sources of data and method of data analysis.

3.1. Description of the Study Area

3.1.1. Physical setting

Mesela *woreda* is one of the 17 *woredas* of Western Hararge Zone of Oromia Regional State. The *woreda* has 25 rural *kebeles* and one urban *kebele*. It is found about 69 km away from Zonal capital, Chiro and 395 km from Regional capital, Addis Abeba in the Eastern part of the country. The *woreda* shares a boundary line with Melka Belo *woreda* in the Southeast, East and Northeast, Chiro *woreda* in the West and Tulo *woreda* in North and Northwest and Gemachis *woreda* in the South and Southwest. Astronomically the *woreda* is located between 8°45'00"N to 9°10'30"N latitude and 47°05'30"E to 47°17'30"E longitude (Fig. 2).



Source: Ethio-GIS Data Base, 2007

Figure 2: Map of Study area

Mesela *woreda* has total area of 654.4 square kilometers. Regarding its geological formation most of the present land forms of the *woreda* was formed during Mesozoic and Cenozoic era. The relief of Mesela *woreda* is characterized by undulating plains of high plateau on its high land areas and undulating low land dissected by small hills having an altitude ranging from 1000 to 2900 meters. The lowest and highest place of the *woreda* is found in Gebis and Mede-Jalela *kebele* (Agedora mountain) respectively. From the southeastern drainage system, Galeyti is major drainage of Mesela *woreda*. Due to its altitudinal location the climatic condition of the *woreda* is dominantly characterized by moderately cool air condition experience a mean monthly minimum and maximum temperature ranging from 16⁰-20⁰c and 20⁰-24⁰c respectively. The remaining type are cool and moderately warm having temperature ranges 10⁰-15⁰c and 24⁰c - 28⁰c respectively. The annual rainfall of the *woreda* ranges from 700mm-1000mm and the average rainy days are 180 days in the year. The rainfall pattern is bimodal, which are short rainy season (*Belg* season from March to April and long rainy season (*Meher* season from June to September).

Based on data obtained from the Socio economic profile of Mesela Woreda 2015, the major soil types of the *woreda* are Orthic, luvisol and Eutric regosol. In addition to these, there are also other soil types like lithosols, Eutric cambisol and chromic cambisol and calsic cambisol covers different parts of the *woreda*. They have fairly good but limited agricultural potential for they have shallow depth that hinders root development and difficult for land preparation. Rapid erosion due to high rate of deforestation is one of the major problems of the *woreda* (MWARDO, 2015). Vegetation type of the *woreda* includes shrub and bush in the low land and open wood land and scattered forests are found in limited places of *Dega* and *Woina Dega* parts. Currently, more or less, the *woreda* is devoid of big and high forest cover. Regarding wild animals, due to lack of enough shelter they are limited both in number and type. Ape, Lions and Leopard are found in the low land area of the *woreda*.

3.1.2. Demographic characteristics

According to estimation made from population and housing census in the year 2010 the total population of *woreda* was 188,578 (Male 95,430 female 93,148). From the total, urban population was 5,609 (male 3000 and Female 2,609) while rural population was accounted for

182,969 (male 92,430 Female 90,539). An average number of households size was 6.3 persons per household. Mesela *woreda* had the crude density of 301.8 people per km²(CSA, 2010).

3.1.3. Socio-Economic condition

The main economic stay of the population of Mesela *Woreda* is agriculture with mixed farming system at subsistence level, producing both crop and livestock. The majority of the population depends on subsistence farming as the livelihood strategy. The agricultural production, sale of livestock and livestock products, petty trade, daily labor, charcoal and fuel wood selling, pottery production, *khat* trade and the like are the main sources of income in the *woreda*. Farming is also depends on rain-fed and seasonal. Thus, in the study area agricultural activities are seasonal. As a result the farmers are not busy throughout the year; even during busy season, some farmers do not fully engage in farm activities (they seat and chew *khat* for long hours). Anyhow, the effect of chewing *khat* for long hours on production needs further investigation.

Thus, Food insecurity is the real and major problem and it needs to search lasting solutions. The major crops grown in Mesela *Woreda* include cereals, *khat* and yellow coffee, pulses and oilseeds. Cereals include Sorghum, Maize, Wheat, *Teff* and Barley, whereas, Pulses include Bean, Peas and field pea. Besides, very small amount oilseeds such as linseeds and *Nug* are grown. *Khat* and yellow coffee are the two most important product cash crops in the study area (MWARDO, 2015). Cattle, goats, sheep, horses, mules, donkeys, and camels are the major type of livestock rearing in the *woreda* (Mesela fish and Animal health protection office 2014).

3.2. Research Design

The main objective of this study is to assess households' food insecurity in Mesela *woreda*, West Hararghe, Oromia Regional State. The descriptive-survey design was used for this particular study, since it helps the investigator to answer questions like what happen, how much, who, when, where and at what level. Also, the motives of applying this research design is that it helps to analysis and describe statistical data which is directly related to the research objectives. Besides, the intention of using this research strategy is that, it helps to collect data from sample population and generalize for the whole population. With regard to time dimension, the study was basically cross-sectional.

Furthermore, in this study mixed research approach was employed. Since each approach has its own strength and weakness while using to conduct a given research; the investigator prefers to use mixed approach to use the advantages of both approaches' strength and to minimize the weakness resulting from using one approach only. To this end, qualitative approach is more concerned with the understanding of the people knowledge, attitudes, and beliefs and quantitative approach deals with statistical values. So the nature of the study mostly demands both quantitative and qualitative type of data from both primary and secondary sources.

3.3.Sample Size and Sampling Techniques

3.3.1.Sample size

The sample size was determined using the formula for sample size determination which was adopted from Yamane (1967) cited in Israel (2009). The formula was given as, $n = \frac{N}{1 + N(e)^2}$

Where; n = is the sample size N = total population size e = level of precision. The total population (N) was 3931. This study was accepted 7% level of precision at 93% confidence level. Thus, for this particular study: the sample size (n) = $\frac{3931}{1 + 3931(0.07)^2} = 194$ households were selected. The investigator believed that, each strata of sampling households has homogeneity in agricultural practices, settlement arrangement and identical in topography, the characteristics of these 194 households can represent the whole population.

3.3.2.Sampling technique

For this study, both probability and non-probability sampling techniques were employed. In the case of non-probability sampling, a purposive sampling technique was utilized in order to select study *woreda* and key informants. The *woreda* was purposefully selected because of the investigator previous and current knowledge, access to get data and understanding food insecurity status of the study subjects. The head of MWARDO and head of Disaster Risk Management Office were purposively selected as key informants because the investigator assumed that they have a better understanding and responsibility which enables to meet the objective of the study. Under probability sampling techniques, the investigator was adopted multi stage mixed sampling procedure was used to draw sample households from target population. Firstly, all *kebeles* of the *woreda* were categorized in to three agro ecological zones (*Dega*,

Woina- Dega and *Kola*) using the stratified sampling technique. Since we are able to get more precise estimates for each stratum or component parts and we get a better estimate of the whole. This means that various strata be formed in such a way as to ensure elements being most homogeneous within each stratum and most heterogeneous between the different strata. Secondly, one *kebele* was selected from each agro ecological zone respectively (namely *Beha Biftu*, *Aba Aman* and *Raha*) through simple random sampling technique. These three rural *kebeles* has total households of 3931. From these households *Beha Biftu* had 865, *Aba Aman* had 1410 and *Raha* had 1656 and five percent of the households was taken as sample households from each total of their households.

In the third stage, probability proportional to sampling technique was employed to draw sample respondents from the selected *kebeles* through the following formula.

$$n = N (S) / \Sigma N \text{ (Tadesse, 2011).}$$

Where, n = the number of required samples of each *Kebeles*, N = Households of each *kebele*, S = Total sample households to be selected and ΣN = Total households of the sample *Kebeles*. Therefore, 43, 69 and 82 sample households were selected from *Beha Biftu*, *Aba Aman* and *Raha kebele* respectively. Totally, 194 sample households were selected from these *kebeles* through systematic random sampling techniques. Fourthly, the skip interval (k) is calculated by dividing the total population (N) by the sample size (n). Then the starting point was selected randomly and every K^{th} element (households) was picked up as a member of the sample respondents from *kebele* administration registration book. N/n which is $3931/194=20$ was the skip interval and the starting sample was randomly selected between 1 and 20. Then, every 20th household in the list of the three *kebeles* was selected as the member of the sample respondents for this study. Finally, 194 were selected for this study.

Table 1. Distribution of sample households

sn	Name of sample <i>kebeles</i>	Agro ecology	Total households (N)	Sample households (n)	Sampling techniques
1.	Beha Biftu	<i>Dega</i>	865	43	Proportional to size
2.	Aba Aman	<i>Woina-Dega</i>	1410	69	Proportional to size
3.	Raha	<i>Kolla</i>	1656	82	Proportional to size
			$\Sigma N = 3931$	$S = 194$	

Source: Own computation based on the above sampling technique.

3.4.Data Types and Sources

In this study, the both qualitative and quantitative data types were collected from both primary and secondary data sources. The primary data were collected through questionnaire, field observation and key informant interview. Secondary data have been gathered from published articles, journals as well as unpublished documents and reports available on the study area. Therefore, the information generated from these data sources were used throughout the analysis.

3.5.Instruments of Data Collection

Structured survey questionnaire, field observation, key informant interview and document analysis were used as the main techniques for collecting data. The purpose of applying these methods is that these data collection techniques helps to collect fresh and valuable (relevant) data from different sources which are essential to meet the research objectives.

Questionnaire: This instrument was applied to collect data on the household food security situation, causes of households' food insecurity, households' livelihood strategies, and coping/adaptive strategies from the sample households of sample *kebeles*. Pre-testing of the questions was undertaken on 15 randomly selected non sample households similar to the selected *Kebele* in Mesela *woreda* before conducting the interview with sample respondents to make necessary modification. The questionnaire was adjusted based on the pretest feedback and it was also translated to the local language (*Afan Oromo*) for the simple understanding of it.

And then,three supervisor and seven enumerators were recruited to collect the data. The parameter used to recruit the enumerators was grade tenth and twelve completions. The supervisors were Development Agents working in selected *kebele*. Then after, one day training was given for both enumerators and supervisors on how to approach households, how to conduct the interview and how to convince the respondent to get relevant information on sensitive economic and social issues. Finally, the questionnaires were distributed and collected under the close supervision of the investigator.

Observation: Prior to collecting data, the investigator was observed the means of livelihood of the communities, Physical factors like topography, infrastructural facilities such as feeder roads

connecting to the main roads, irrigation facilities, marketing situations, financial institutions (rural credit services) of the study area. The investigator was also observed the existing general situation such as people's way of life, their assets and resources, the ups and downs to overcome their daily struggles, their activities for living, etc., which would provide valuable and supportive information and enabled the investigator to describes and gives more visual plates on the situation.

Key informants interview (KII): Three key informants were also interviewed to share their opinions about food insecurity situation of the households in the study area. Three of the key informants were working in Agriculture and Disaster Risk Management offices.

Document analysis: Secondary data were collected from Books, official published documents and many official documents of the present government served as the source materials for the policy analysis. The published census reports from the Central Statistical Authority are data sources for the demographic characteristics of the population at various scales. Unpublished reports and other documents from the *woreda* offices and *Kebeles* were also accessed for data on certain issues.

3.6.Data Analysis and Interpretation Methods

3.6.1.Descriptive Statistics

Following the compilation of the data collection, the sample household responses were coded and entered in SPSS version 20 software for statistical analysis. Descriptive statistics like mean, standard deviation, percentage, graphical and tabular analysis were used to explain households' food insecurity status in the study area based on demographic, socio-economic, physical and institutional related variables. Moreover, bivariate association between households' food insecurity status and selected variables are examined in order to better understand characteristics associated with food insecurity. Non parametric statistics, chi-square test was conducted to determine relationships between categorical variables in bivariate analysis. And the t-test was run to investigate any statistically significant mean difference in some selected predictor variables between food secure and food insecure households.

3.6.2. Measuring Food Insecurity Status of Households

Dietary energy supply measured in kilocalorie (kcal) was used to determine food security status of a household; since it is the single most important indicator of food adequacy level (Qureshi 2007). Households' Food insecurity Status, a dependent variable in this study, was measured in four steps. Firstly, food supply at household level was determined by using a modified version of the regional food balance model, which was also used by Smith and Subandoro (2007) and Mesay (2009). The following variables entered the Balance Sheet as additions to or subtractions from own production of grain at household level:

$$HHFA = Y + FP + FA + R/G - S - SR - PHL$$

Where HHFA = household food availability;

Y = own production;

FP = food purchased;

FA = food aid;

R/G = remittance/gift;

S = amount of grain sold;

SR = seed reserves (5%); and PHL = post-harvest loss (10%).

Secondly, the food supply at household level calculated in step one was used to calculate calories available per kilogram per person per day for each household. Thirdly, following FDRE (1996), 2 100 kilo calories per person per day was used as a measure of calories required (i.e. demand) to enable an adult to live a healthy and moderately active life. Fourthly, the difference between calories available and calories demanded by a household was used to determine the food insecurity status of a household. Subsequently, households whose per capita available kilocalorie was greater than the minimum demand were categorized as food secure (coded as 0), while households experiencing kilocalorie deficiency were considered food insecure (coded 1). In view of this, the response variable food insecurity status of the i^{th} household mentioned as a dummy variable.

3.6.3. Causes of food insecurity

In order to identify the most determinants of households' food insecurity situation, the binary logistic regression model was used. In practice many researchers choose the logit model because of its comparative mathematical simplicity (Gujarati, 2004). Therefore, in this study logit model was chosen for its simplicity and less complexity of its interpretation. This model was used to

see the relative influence of households' demographic, economic, social, institutional variables and coping strategies on food insecurity status. Identification of determinants by the descriptive statistics is not enough to explain the relative influence of each factor on households' food security status. Thus, the model was applied to identify the potential variables affecting households' food security status in the study area; using the household food insecurity status (HHFIS) as dependent variable where by a value of 1 is given to households belonging to food insecure households group and 0 for the food secure households group.

3.6.4. Coping and Adaptive strategies

The coping mechanisms used by food insecure households were also identified and analyzed using descriptive statistics and the local coping strategies practiced by households in the study area were different since food insecurity conditions vary spatially and temporally.

3.7. Definition of Variables and Hypothesis

3.7.1. Dependent Variable

Household food insecurity status (HHFIS): It is a dichotomous dependent variable in the model taking a value 1 if the household is food insecure and 0 otherwise. Households' food insecurity status was determined by comparing total kilocalories consumed in household per adult equivalent per day with the daily minimum requirement of 2100kcal/AE/day. Households getting 2100kcal/AE/day and above were considered as food secure and otherwise food insecure.

3.7.2. Independent variables

Independent variables that are hypothesized to affect the food insecurity status are presented below.

Sex of the household head: It is dummy variable taking a value of 1 if the household head is female and 0 otherwise. According to Tefera (2009), households' food security status has influenced by sex of household heads. Therefore, it is expected that female headed households have more chance to be food insecure and has positive relationship with food insecurity.

Family size: it is continuous variable and measured in AE. This variable refers to the size of household members who live together under the same roof converted to AE. The expectation is that as the family size increases the probability of the household to be food insecure increased (Hilina, 2005). According to reviewed literatures, increasing family size tends to exert more pressure on consumption than contribution to production (Tsegay, 2009). Therefore, it is hypothesized that large family size has positive relationship with food insecurity.

Age of the household head: it is a continuous explanatory variable referring to the age of the household head measured in years. As the age of household head increases, the probability that the household is becoming food insecure decreases, since younger household heads are expected to have relatively poorer experiences of the socio-physical environments and farming than older household heads while older people have relatively richer experiences of the social and physical environments as well as greater experience of farming activities; that is, when household heads get higher age, they are expected to have stable economy in farming (Fekadu, 2008). 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. Indris (2012) indicated in his study that the age of the household head affect food insecurity negatively. Therefore, it is hypothesized that age of the household head has negative relationship with food insecurity.

Farm size: it is continuous variable and measured in hectares and refers to size of the cultivated land. So that households with large cultivated land size are expected to produce more and those with small cultivated land are expected to produce less. Thus, Lewin and Fisher (2010) indicated in their study that size of cultivated land and food insecurity has negative relationship. Therefore, it is hypothesized that size of cultivated land and food insecurity has negative relationship.

Dependency ratio: is measured as total household size divided by the number of individuals working to support the household. Due to the scarcity of resources, an increase in household size especially the non-working members put pressure on consumption than production (Mequanent *et al.*, 2014). This indicates the number of children under age of 14 years and old age above 64 expressed in terms of adult equivalent or a ratio of active family labor members (i.e. age 15-64). As the number of dependents increases, the active labor forces beside themselves are obliged to

support these dependents. Thus this leads to the share of resources and income obtained by the active labor force and hence a decline to the well-being of the household in average terms. Abebaw (2003) have come up that dependency ratio and food insecurity has positive relationship. Thus, the hypothesis is that a household with large economically non- active family members tend to be food insecure than those with less burden of dependents.

Education level of the household head: is dummy variable measured in whether the household head can read and write or not by taking the value of 1 if the household head cannot read and write and 0 if the household head can read and write. The educational level of the household head is an important social factor which is expected to affect food insecurity status of households negatively (Frehiwot,2007). That is, the more the educational level of the household head, the more the possibility of household to diversify their livelihood so that the less possibility the household to become food insecure.

It is assumed that households' heads that cannot read and write are less likely to understand modern farming technologies provided to them through any media like extension workers, radio and others while literate (who can read/write) households would have a greater ability to obtain, process, and use information about improved technologies. Thus, with respect to some specific characteristics of food insecure and food secure households, educational level was hypothesized to have a negative relationship with households' food insecurity status.

Livestock owned (TLU): it is continuous and measured in TLU. Households who possess large number of livestock are expected to be less vulnerable to food insecurity than the one who have few livestock. Since households with larger number of livestock produce more milk, milk products and meat for direct consumption and owners could be more food secured. Besides, the contribution of livestock to food security includes the manure and income from sales of livestock and livestock products, which are often used for purchase of food grains during times of food shortage. Livestock sale is also used as the major coping strategy during famine and seasonal food shortage. The higher the value of TLU, the higher will be the probability of being food secure (Adugna and Wogayehu, 2011). Therefore it is hypothesized that large number of livestock and food insecurity has negative relationship.

Income from different sources: It is continuous variable and was measured in birr. It represents the amount of income the households earn in the year from various sources. Basher (2010) indicated in his study that the amount of households' income and food security has positive relationship. It is hypothesized that households who managed to earn higher income are less likely to be food insecure. Therefore; income is expected to have a negative impact on food insecurity.

Attitude towards food Aid: it is dummy variable measured in whether the household head has dependency feeling on food aid or not by taking the value of 1 if the household has dependency feeling on food aid and 0 if the household has not dependency feeling on food aid. In most cases, food aid had a negative effect on the attitudes of farmers towards work and their own agricultural activities. Households who have dependency feeling on food aid are more likely to suspend productive work on their farm plots and spend less time supplying labor to agricultural and non-agricultural activities in preference to aid and were expected to be more food insecure than others (Zelalem, 2014).

Similarly, Oxfam (2004) reported that some households in Tigray and Amhara regions of Ethiopia even depleted their livestock resources in order to become poor and qualify for food aid and households feel that they will be disqualified if they produce food grains or their own livestock. A shift from dependency attitude to self-reliance decreases the probability of food insecurity by 25% (Alem, 2007). Therefore, the dependency feeling on food aid is expected to have a positive impact on food insecurity.

Access to irrigation: it is dummy variable and taking value 1 if household is not access to irrigation, other wise 0. Access to irrigation increases crop yield and productivity and this bring food insecure households to become food secure. Therefore, access to irrigation is expected to affect food insecurity status of the households negatively.

Access to credit use: it is dummy variable measured in whether the household head is to access to credit use or not and taking value 1 if the household is not access to credit use and 0 otherwise. Credit decreases the probability of the households to become food insecure, because credit is used for many purposes like consumption or purchase of agricultural input such as chemical

fertilizers and improved seeds, etc. As a result, it was hypothesized that households who are getting the amount of credit they required have less probability of becoming food insecure than others (Abdiraman, 2015). Therefore, access to credit is expected to affect food insecurity negatively.

Off/non- farm participation: it is dummy variable and measured in whether household head did participate (0) or did not participate in off/non-farm activities (1). The success of households and their members in managing food insecurity is largely dependent on their ability to engage on off/farm/non-farm job opportunities which could serve as livelihood diversification strategies (Adugna, 2008). Hence, it is hypothesized that the participation of households in off-farm/non-farm activities is negatively affect food insecurity.

Table 2. Summary of variables definition, measurement and hypothesis

Variables	Variable type	Variable definition and measurement	Expected sign
Food insecurity status	Dummy	1 if the household is food insecure; 0 otherwise	
Sex	Dummy	1 if the household is female; 0 otherwise	+
Family size	Continuous	Family size in adult equivalent	+
Age	Continuous	Age of the household head in years	-
Dependency ratio	Continuous	Ratio of dependents to active members	+
Farm land	Continuous	Land cultivated in hectares	-
Livestock	Continuous	Livestock owned in TLU	-
Income in Birr	Continuous	Income of household from various activities	-
Education	Dummy	1 if the household can read/write, 0 otherwise	-
Food aid	Dummy	1 if the household has dependency feeling on food aid, 0 otherwise	+
Irrigation	Dummy	1 if the household is not access to irrigation, 0 otherwise	-
Credit	Dummy	1 if household is not access credit , 0 otherwise	-
Off/non-farm activities	Dummy	1 if the household did not participate in off/non-farm activities, 0 otherwise	-

Source: Own definition, 2016

4. RESULT AND DISCUSSIONS

This chapter presents and discusses the results of households' food insecurity assessment in the study area. The first section of the chapter reports the food insecurity status of the households. The next three sections present socioeconomic background, about physical factors, institutional characteristics of the sample households. The purpose of these sections is to provide the first impression about households' food insecurity status. Finally, the results of descriptive statistics and econometric analysis of the causes of food insecurity in the study area is presented and discussed.

4.1. Descriptive Statistics Results

4.1.1. Background Characteristics of the Respondents

A range of basic socio-demographic information was collected from surveyed households. Age, sex, family size, marital status, Educational status, Religion, Language and Ethnicity are vital socio-demographic variables and provide deep insights into background characteristics of the population under study. In the study area, the majority (56.7%) of household heads were within the age ranges of 25 to 44 years while the small proportions (3.6%) of the respondents were in the age group of 65 years and above. The mean age of the sample household heads was 44 years with minimum 25 years and maximum 80 years. The older household heads (above the sample mean) were about 46.4%, whereas 53.6% were younger household heads (below the sample mean) (Table 3). Regarding sex of household heads about 84.5% and 15.5% were male and female headed respectively (Table 3).

For the sample of households, the majority (63.9%) had 4-7 family size while 35.6% had 8 and above family size. The average household size of respondents was 6.62 persons. In general, the size of households ranged from a minimum of 3 to a maximum of 11 persons per household (Table 3). In terms of marital status, the data indicates that about 81.4% of household heads were married, 8.8% divorced / separated, 8.2% widowed, and the remainders (1.6%) were single. (Table 3). In terms of education, the majority (92.8%) of the respondents have been found to be illiterate (cannot read and write) and only small percentage (7.2%) can read and write (Table 3).

On the other hand little variation among study population was observed in relation to ethnic, language and religious background. Household heads in the study exhibited that the Oromo ethnic group and Afan Oromo speakers dominated in the area (97.9% and 99% respectively) of the sample, followed by Amhara ethnic group and *Ahmaric* spoken households (2.1% and 1% respectively). Meanwhile most respondents (over 88.1 %) were Muslim followers, while about 11.3% were Christians and a very few respondents (0.5%) were followers of other religion.

Table 3. Background Characteristics of Respondents

Socio-demographic characteristics of HH heads		Frequency	Percent
Age of HH heads	25-44 years	110	56.7
	45-64 years	77	39.7
	>65 years	7	3.6
	>44 years (Older HH heads)	90	46.4
	<44 year (Younger HH head)	104	53.6
	Mean age	43.62	
	Minimum age	25	
Sex of HH heads	Maximum age	80	
Sex of HH heads	Female	30	15.5
	Male	164	84.5
Family size	<3	1	.5
	4-7	124	63.9
	8 and Above	69	35.6
	Mean family size	6.62	
	Minimum family size	3	
	Maximum family size	11	
Educational status	can read and write	14	7.2
	cannot read and write	180	92.8
Marital Status	Single	3	1.6
	Married	158	81.4
	Divorced	17	8.8
	Widowed	16	8.2
Religion	Muslim	171	88.1
	Christian	22	11.3
	Others	1	.5
Language	Afan Oromo	192	99.0
	Amharic	2	1.0
Ethnicity	Oromo	190	97.9
	Amhara	4	2.1

Source: Field Survey, December, 2016

Moreover, the results of the descriptive statistics of selected variables affecting households' food insecurity were demonstrated using tables and percentage. In doing so, respondents were treated in two food categories. The difference between these two categories was assessed using chi-square and t-test statistics for discrete/dummy and continues variables respectively. Out of the hypothesized discrete/dummy variables; education level of household, the attitude of households towards food aid, access of credit, access of irrigation, slope of farmland and soil fertility of farm were found to significantly difference across households at less than 1% level. Similarly, age, family size, dependency ratio, farmland size and livestock in TLU were continues variables which shows significant mean difference between food secure and food insecure categories.

Table 4. The Mean kilocalorie available for sampled households in the study area

Kcal available per AE/day	Food Insecure 179(92.3%)	Food secure 15(7.7%)	Total 194(100%)	<i>t-value</i>
Mean	1104.01	3080.54	1256.84	-10.757**
St. Deviation	463.31	698.86	716.63	
Max	2074	4430	4433	

** Statistically significant at 0.01 significance level.

Source: Field Survey, December 2016

Table 5. Descriptive statistics of demographic variables between food secure and food insecure categories in the study area

Demographic variables		HHFIS						x^2
		Total N= 194		Food Insecure N=179		Food secure N=15		
		N	Mean/ %N	Mean/ %N	Mean/ % n	Mean/ %N	Mean/ %n	
Sex	Female	30	15.5	16.2	96.7	6.7	3.3	.962 (.327)
	Male	164	84.5	83.8	91.5	93.3	8.5	
Age in year		194	43.62	179	42.8	15	53.4	4.176(.000)**
Family size		1284	6.62	1209	6.75	75	5	-4.072(.000)**
Depend/Ratio		714	125.3	679	128.4	35	85.4	-3.424(.001)**

** Statistically significant at P<1%.

Source: Field Survey, December 2016

Table 6. Descriptive statistics of economic variables between food secure and food insecure categories in the study area

	HHFS status						
Economic	Food Insecure(179)		Food secure(15)		Total		<i>t-value</i>
variables	Mean	SD	Mean	SD	Mean	SD	
Farm land(ha)	0.33	0.18	1.23	0.29	0.40	0.31	-11.630 **
Livestock in TLU	2.18	0.69	4.25	0.83	2.34	0.89	-9.263 **

** Statistically significant at 0.01 significance level.

Source: Field Survey, December 2016

Table 7. Descriptive statistics of socio-cultural variables between food secure and food insecure categories in the study area

Socio-cultural Variables		HHFIS status						X^2
		Total		Food Insecure		Food Secure		
		N= 194		N= 179		N=15		
		N	%N	%N	%n	%N	%n	
Education	Cannot Read & Write	180	92.8	96.6	96.1	46.7	3.9	51.637**
	Can Read and Write	14	7.2	3.4	42.9	53.3	57.1	
Attitude towards Food aid	Yes	174	89.7	95	97.7	26.7	2.3	69.836**
	No	20	10.3	5	45	73.3	55	

** Statistically significant at less than 1% of significance level

Source: Field Survey, December 2016

Table 8. Descriptive statistics of institutional variables between food secure and food insecure categories in the study area

Institutional		HHFIS status						X ²
variables		Total		Food Insecure		Food Secure		
		N= 194		N= 179		N=15		
		N	%N	%N	%n	%N	%n	
Access to irrigation	No	185	95.4	98.3	95.1	60	4.9	51.637
	Yes	9	4.6	1.7	33.3	40	67.7	(.000)**
Access to credit use	No	176	90.7	96.1	97.7	26.7	2.3	69.836
	Yes	18	9.3	3.9	38.9	73.3	61.1	(.000)**

** Significant at P<1%

Source: Field Survey, December 2016

Table 9. Descriptive statistics of Bio-physical variables between food secure and food insecure categories in the study area

Bio-physical variables		HHFIS				χ^2
		Food Insecure		Food Secure		
		N	%	N	%	
Soil fertility status	Good	49	27.4	8	53.3	4.495
	Poor	130	72.6	7	46.7	(.034*)
Categories of Slope of farm land	Plain	34	19	6	40	
	Steep	76	42.5	5	33.3	3.757
	Hilly	69	38.5	4	26.7	(.153)

* Significant at P<5%

Source: Field Survey, December 2016

Table 10. Coping strategies practiced in the study area by sample HHs.

Coping strategies(short term activities)	Households' food insecurity status in %					
	Total		Food insecure		Food secured	
	n	% N	% N	% n	%N	%n
Receiving relief aid	177	91.2	98.9	100.0	-	-
Consume seed stock	165	85.1	89.4	97.0	33.3	3.0
Purchasing grain/food item	138	71.1	76.5	99.3	6.7	0.7
Reduce size and number of meal per day	135	69.6	73.7	97.8	20.0	2.2
Borrowing of cash / food	130	67.0	72.1	99.2	6.7	0.8
Sell of small ruminants and draft oxen	125	64.4	68.2	97.6	20.0	2.4
Daily wage labor	115	59.3	63.1	98.3	13.3	1.7
Sell of firewood, charcoal	98	50.5	53.1	96.9	20.0	3.1
Withdrawing children from school	42	21.6	23.5	100.0	-	-
Migration	15	7.7	8.4	100.0	-	-

Source: Field Survey, December 2016.

Table 11. Adaptive Strategies practiced by food insecure and secure households

Adaptive(long-term) Strategies	Households' food insecurity status in %					
	Total		Food insecure		Food secure	
	N=194		N=179		N=15	
	n	%N	%N	%n	%N	%n
Natural conservation	18	9.3	3.9	38.9	73.3	61.1
Diversifying crops	16	8.2	1.7	18.8	86.7	81.2
Livestock diversification	15	7.7	2.8	33.3	66.7	66.7
Fruits , vegetables and Tree growing	12	6.2	1.7	25.0	60.0	75.0
Growing fast maturing plants	10	5.2	1.1	20.0	53.3	80
Water harvesting techniques	3	1.5	0.6	33.3	13.3	66.7

Source: Field Survey, December 2016.

Table 12.Livelihood strategies of sampled households

Variable		HHFIS status						χ^2
		Total		Food Insecure		Food Secure		
		N	%N	%N	%n	%N	%n	
Off/non-farm	No	177	91.2	96.1	97.2	33.3	2.8	68.177 (.000)**
	Yes	17	8.8	3.9	41.2	66.7	58.8	

** Significant at P<1%

Source: Field Survey, December 2016

4.2. Econometric Results

Logistic regression model was used to identify the most determinants of food insecurity in the study area. Accordingly, among many variables assumed to have association with household food insecurity status in different contexts eight of them (Age of household head, Family size, dependency ratio, size of farm land, livestock owned in TLU, educational level of household head, access to irrigation and off-farm/non-farm participation presented in Table 13 were found to be significant at less than 1% probability level.

Table 13. Results of Logistic regression model for sampled households

Variables	Estimated Coefficient	Odds Ratio	Significance Level
Age	-0.093	0.911	.000**
Family size	0.889	2.434	.001**
Dependency Ratio	0.037	1.038	.001**
Livestock in TLU	-2.865	0.68	.001**
Farm land size	-3.831	0.22	.000**
Educational Status	-3.495	0.30	.000**
Irrigation	-3.666	0.69	.000**
Off/non-farm income	-3.895	0.26	.000**

** Significant at $P < 1\%$ level of significance

Source: Field Survey, December 2016.

Discussion

The results of descriptive statistics and econometric results were discussed as follows:

4.3. Households' Food Insecurity Status

Households' Food insecurity Status, a dependent variable in this study, was measured in four steps. Firstly, food supply at household level was determined by using a modified version of the regional food balance model as additions to or subtractions from own production of grain at household level. Secondly, the food supply at household level calculated in step one was used to calculate calories available per kilogram per person per day for each household. Thirdly, following EHNRI (1997), 2,100 kilo calories per person per day was used as a measure of calories required (i.e. demand) to enable an adult to live a healthy and moderately active life. Fourthly, the difference between calories available and calories demanded by a household was used to determine the food insecurity status of a household.

According to the result presented in Table 4 the mean calorie intake per adult equivalent for the overall sampled households was 1256.84. The finding of the study shows that the mean calorie intake per adult equivalent for food insecure households was 1104.04, whereas for food a secure household was 3080.54. There is a statistically significant mean difference between the food

insecure and food secure households ($t=-10.757$, $p=0.00$). The study area could be classified as food insecure given the fact that about 92% of sample households were not getting the minimum daily energy requirement for an individual to live healthy life. Thus, this study found high prevalence of food insecurity in the study area.

4.4. Causes of Food Insecurity

The second objective of this study was to identify causes of food insecurity in the study area. This section presents the demographic, economic, socio-cultural, Physical and institutional factors responsible for households' food insecurity in the study area. The variables discussed under this topic are those expected to have certain relations with food insecurity.

The Demographic Factor: The variables discussed here are those which do have influential relationship to the food insecurity status of a household in the study area. Age, sex, family size in AE and dependency ratio were demographic variables given due consideration. As the result in the Table 13 shows of the total respondents, 164 (84.5%) and 30(15.5%) were male and female headed households respectively. About 91.5% and 8.5% of male headed households were food insecure and food secure respectively. Whereas, about 96.7% and 3.3% of Female headed households were food insecure and food secure respectively. This shows the proportion of food insecurity is higher among households who led by women.

This may be for the reason that female-headed households are usually constrained by resources. They are mostly deprived in terms of resource endowment like land, labor and capital. Mostly they share their land to men farmers. Hence, it confirms the hypothesis that female-headed households are more likely food insecure than male headed households. However, the chi-square test result shows that there is no significant systematic contingency relation between the two variables with chi value of 0.962 and P value of 0.327 (Table 5). The reason behind the insignificant association between sex of household headed and households' food insecurity status might be due to the higher number of male headed households included in the sample.

The mean age of the respondents was 43.62 years (SD= 9.883 years) with Minimum of 25 and maximum of 80 years. According to the result of the study the mean age of food insecure and food secure household heads was 42.8 years (SD= 9.654) and 53.4 years (SD= 6.08) respectively.

The mean age difference between food insecure and food secure household heads was found to be significant with t -value of -3.332 and $P < 1\%$. Moreover, the econometric result revealed that there is a negative relationship between the age of the household head and food insecurity, which is statistically significant at $P < 1\%$ (Table 4).

This means that an increase in the age of the household head decreases the likelihood for the household to become food insecure (Meskerem, 2011). This is possible because as households acquire more and more experience in farming operations, accumulate wealth and use better planning, they have better chances to become food secure. Likewise, 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. The odds ratio, keeping other factors unchanged, in favor of food insecurity decreases by a factor of 0.91 when age of the household head increases by one year. This result confirms with Frehiwot (2007) finding.

The mean family size of sample respondents was 6.62 with minimum 3 and maximum 11 while the mean family size was 6.75 (SD= 1.63) and 5 (SD= 1.19) for food insecure and food secure households respectively. This is greater than the EDHS (2011) national average of 4.6 and found to be larger than the 2008 Oromia region average value 4.8 (5.0 in rural areas and 3.8 in urban areas) (CSA, 2010). The finding of the result showed a statistically significant mean family size difference between food insecure and food secure households with t -value of -4.072 and $P < 1\%$ (Table 5). Furthermore, the odds ratio (OR=2.434, $p > 0.001$) shows keeping other variable constant, households' food insecurity increases by a factor of 2.434 as household size increases by one AE (Table 13). In other words, as the number of family size increases, family food demand also increases in an area where households depend on less productive agricultural land and it resulted in increasing demand for food, which in turn cannot be matched with the existing food supply, so ultimately end up with food insecurity.

In the study area out of the total family sizes of the respondents, 688 were under 15 years, 570 were 15-64 years and 26 were above 64 years. Thus, the overall dependency ratio of the respondents in the study area was about 125%. This means; every 100 persons within the economically active population groups support not only themselves, but also supporting 125 dependent family members with all basic necessities. This clearly shows there is a high

dependency ratio in the study area. The mean dependency ratio of food insecure and food secure household was about 128% and 85% respectively. The *t-test* result showed that there is statistically significant mean difference in dependency ratio between food insecure and food secure households at less than one percent probability level with *t*- value of -3.424 (Table 5).

Moreover, households with large family size, when composed mainly of nonproductive population (children and old age) could face the probability to be food insecure due to high burden imposed on active labor (Shumate, 2009). Dependency is burden to every households, it was also a catalyst for food insecurity (ibid). The result of descriptive analysis shows that there is statistically significant positive relationship between dependency ratio and food insecurity at less than 1 percent probability level (Table 5). The positive sign shows that the probability of becoming food insecure is high for households where productive members are less than unproductive members. Furthermore, according to the result of econometric analysis, if other variables remaining constant, as dependent age group (<15 and >65) increases by a unit, the probability that the household is food insecure increases by a factor of 1.038 (Table 13). This result coincides with findings of Mequanent *et al.* (2014).

Economic factor: the size of farm land, livestock owned in TLU and income were the economic variables included in the analysis. As Table 6 shows, the average cultivated land of the sampled households was 0.4 ha with a standard deviation of 0.31. While the average cultivated land was 0.33 ha (SD=0.18ha) and 1.23 ha (SD=0.29 ha) for food insecure and food secure households respectively. This shows there is statistically significant mean difference between food insecure and food secure households in terms of cultivated land at less than one percent probability level. As the result in the Table 6 shows that food insecure households were relying on very small pieces of land than the food secure households to meet their food requirement. Furthermore, during the key informant discussion with the *Woreda* Agriculture and Rural Development Office head and Disaster Risk Management Experts, it was also noted that land in the study area is becoming more and more fragmented and scarce due to growing population size and population densities.

Similarly, the econometric result shows that land size owned by household heads was found to have significant ($P < 0.01$) and negative relationship with food insecurity status of households suggesting the larger the land size, the better food secure state of the household. The possible

explanation is that the major source of food in the study area comes from own production and there was limited access to other means of income generating activities. So the household who have large size of land has better production which gives a better chance for the household to be food secured. The odds ratio of 0.22 for farm size indicates that, other things being constant, the odds ratio in favor of household food insecurity status decreases by a factor of 0.22 as the farm size increases by one hectare (Table 13). This result is in agreement with the findings of Mulugeta (2002).

The mean livestock holding of the sampled households was 2.34 TLU (SD=0.89) and 2.18 TLU (SD=0.69) and 4.25 TLU (SD=0.83) for food insecure and food secure households respectively. The t-test for the equality of the means in livestock holding between food insecure and food secure households shows that there was statistically significant mean difference at less than one percent probability level (Table 6). Likewise, the relationship between the amounts of livestock holding in tropical livestock unit and food insecurity turned out to be negative and statistically significant at one percent of probability level. This is an indication that ownership of livestock acts as a hedge against food insecurity. The result of econometric analysis indicates that, if all other things are held constant, the odds ratio (OR=.68, $P > .001$) in favor of food insecurity decreases by a factor of 0.68 when the amount of livestock owned by a household rises by one TLU (Table 13). This result is supported by Indris (2012).

It was hypothesized that livestock holding in TLU is negatively related with the problems of food insecurity in that households with large number of livestock in TLU have better chance of becoming food secure than otherwise (Teodros, 2011). Similarly, livestock production is the important part of crop production in the rural areas in that it enables households to earn better income with which they can purchase food when they are in short of their stock and invest in purchase of inputs that increase their production. And this in turn enables households to ensure food security at household's level (Adunga and Wogayehu, 2011). Livestock, besides its direct contribution to subsistence need and nutritional requirement, is a vital input into crop production by providing manure and serves to accumulate wealth that can be disposed during times of need, especially when food stock in the household deteriorates (Abdiraman, 2015).

Socio-cultural factors: The variables discussed here are educational status and households' attitude towards food aid and the results of the socio cultural variables hypothesized to differentiate between food insecure and food secure households are presented in the Table 7 and discussed as follows: The data obtained from the sample respondents revealed that 92.8% were illiterate (cannot read and write) whereas 7.2% were literate (can read and write). An attempt was made to examine the association between education levels of the respondents and their food insecurity status. From the total of illiterate (cannot read and write) sample respondents considered for this study, it was observed that only 3.9% of them were food secure and the remaining 96.1% were food insecure. On the other hand from the total of literate (can read and write) sample respondents, it was observed that 57.1% of them were food secure and 42.9% were food insecure.

Thereby showing that, there is a negative association between the food insecurity and the level of education that they have attained. Here it is good to note that these observed associations between education level and food insecurity status of the respondents were found to be statistically significant $\chi^2 = 51.6371$, $p < .001$ (Table 7). Moreover, the model result in Table 13 confirms that uneducated household heads (who cannot read/write) have high probability to be food insecure than educated household heads (Frehiwot, 2007). The possible explanation for this finding may be educated households apply their knowledge and skill gained from various sources on they apply in their farm activities and thereby increase production and productivity and achievement of household food security. The odds ratio ($OR=0.30$, $p > .001$) in favor of household food insecurity decreases by a factor of 0.30 when the household becomes educated. It was assumed that a literate household head is often tends to adopt new skills, ideas and which in turn have negative effects on food insecurity. Because of this educated households are somehow in a better position (wealth) status than that of the illiterate households (Abiyot, 2011).

Another important socio-cultural variable considered is the attitude of households towards food aid. The respondents were asked their attitude towards food aid during data collection. The result in the Table 7 revealed that of total respondents 89.7% have dependency feeling on food aid (of which 95% were food insecure) and 10.3% have no dependency feeling on food aid (of which 73.3% were food secure). This shows that there is high dependency feeling on food aid in the study area in general and among food insecure households in particular. Hence, the positive

association between the dependency feeling on food aid and food insecurity status of the respondents was found to be statistically significant with $\chi^2 = 69.836$, $p < .001$ (Table 7).

Institutional factors: Here the variable considered are access to irrigation and credit use and their result is presented in the Table 8 and discussed below: As it can be seen from Table 8, of total sampled households' access to irrigation accounted for 4.6% while not access to irrigation accounted for 95.4%. The proportion of food insecure households who were not access to irrigation was 95.1% while the proportion of food secure households who were not access to irrigation was only 4.9%. This shows that there is statistically significant association between access to irrigation and households' food insecurity at less than 1 percent probability level.

Furthermore, the model result in Table 13 shows that other things held constant, odds ratio with respect to access to irrigation was 0.69. This means food insecurity is less likely to occur if a household is access and uses irrigation. This can be justified by the fact that in rain fed agricultural areas, where there is high rainfall variability; getting access to irrigation would improve the situation and helps farmers to augment productivity and enhance their production by producing more than twice a year using irrigation (Alem, 2007).

Table 8 also shows that from the total sampled households 90.7% were not access to credit use. The proportion of food insecure households who were not access to credit use was higher (97.7%). This proved the hypothesis that, households who were access to credit service have less probability of becoming food insecure than others; because credit is used for many purposes like consumption or purchase of agricultural input such as chemical fertilizers and improved seeds, which in turn boost the amount of production.

Bio-Physical factors: Here the fertility of soil and slope of farm land were bio-physical variables given due consideration and their result is presented in the Table 13 and discussed below: As Table 13 shows large proportion of food insecure household (72.6%) perceived that their soil fertility is poor and 42.5% of them have steep slope of farm land. On the other hand 53.3% of food secure households perceived their soil fertility is good and 40% of them have plain farm land.

4.5. Households' Response to Food Insecurity

4.5.1. Coping strategies

Respondents were asked a list of coping strategies they probably pursue at times of food shortage. Table 10 shows that, about 91.2%, 85.1%, and 71.1% of total respondents were used receiving food aid, consume seed stock and purchasing grain as coping strategies respectively. The proportion of food insecure households who received food aid, practiced purchasing grains/ food items, reduce meal size and consume seed reserve during food supply shortage was higher than the proportion of food secure households. For instance, about 98.9% of the food insecure households reported that they receive food aid from government. 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 strategies for about 69.6% of sample households and 73.7% of food insecure households (Table 10).

Another important coping mechanism considered by sample households was borrowing cash or grain from others and this was also practiced by 67% of sample households and 72.1% of food insecure 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 64.4% of the sample respondents 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 households keep animals as principal assets to manage the shortage. Even though there was limited access to off-farm work opportunity in the study areas, about 59.3% of sample respondents were work in other farmer's farm for wage earned in kind or cash (Table 10).

The survey results further revealed that about 50.5% of sample respondents and 53.3% of food insecure households in the study area practices sale of fire wood and charcoal as coping strategies. About 23.5% of the food insecure households withdraw children from school as coping mechanism. As crisis persist in the area, finally they decide to out migrate to cope with food supply short fall. About 8.4% of the food insecure households reported seasonal migration

to another area like Ilu Aba Boor, Wellega, Bale and other parts of Oromia Region. With respect to the period of food shortage more than 86.3 % of the households encountered severe food shortages during the months of May, June, July and August.

In general, the analysis has different patterns. All households were not equally vulnerable to food insecurity, thus, 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 withdraw children from school and leave their home. Moreover, this study shows how the households respond to the food shortage and also highlights how most households in the study area are vulnerable and how food insecurity is serious. Hence, factors like shortage of farm land, rugged topography, rainfall variability, poor infrastructure, lack of off-farm job opportunities and lack of credit facilities aggravate food insecurity and made households more vulnerable.

4.5.2. Adaptive strategies

Some of adaptive strategies practiced in the study area are presented in the Table 11 and discussed as follows. As it can be seen in Table 11, diversification of livestock kept, crop diversification, natural resource conservation, tree growing, growing fast maturing crops and practice of water harvesting were the main adaptive strategy for food secure households in the study area. as the survey result shown us in the Table 11, about 86.7% of food secure households were used diversification of crops such as barely, sorghum, wheat, maize; about 66.7% were used diversification of livestock kept like sheep, goats, cow, donkey, chickens. In-depth interview with key informants indicated that adaptive strategies employed by the food secure households in the study area have improved the availability of food and sources of income. Moreover, food secure households were practiced adaptive strategies like growing of trees (60%) and natural resource conservation (73.3%). On the other hand, though water harvesting and fast maturing plants are vital strategy in drought- prone areas such Mesela, the survey result showed that it was the least used strategy in both household categories.

. 4.5.3. Livelihood strategies

In the study area households diversify their incomes through participating in various income generating activities. In this study households' livelihood activities was measured by asking sample households whether or not engaged in any of off/non-farm activities. It was hypothesized that, households who did not engage in off-farm/non-farm activities are more likely to face food deficit if farm income is not enough. Hence, the survey found out that about 91.2% of sample households did not engaged in any off/non-farm activities. Whereas 8.8% of total respondents were participate in off/non-farm activities. The proportion of households who did not engaged in any off/non-farm activities was higher (97.2%) for food insecure households than their counter parts. The statistical analysis showed significance proportion difference in terms of households' participation in off/non-farm activities between food insecure and food secure households at 1% probability (Table 12).

Besides, the finding of econometric result also showed that households which engaged on off/non-farm activities tend to be more food secure. The possible explanation of this is, those households who engaged in various off farm/non-farm activities were tend to get more income, which in turn helps households to reduce food insecurity. Moreover, households who engaged in off farm/non-farm activities have better chance to be food secure. This might be due to the fact that households who engaged in off farm/non-farm activities were better endowed with additional income and more likely to escape food insecurity. The odds ratios ($OR = 0.26, p > .001$) indicate that keeping the influences of other factors constant, households' food insecurity decrease by the rate of 0.26 as off farm/non-farm income increases by one unit (Table 13). This finding is consistent with the finding of Ababaw (2003).

5. SUMMARY AND CONCLUSIONS

5.1. Summary

The study area is one of the food insecure areas of the Oromia Region. The presence of physical, socio-economic, cultural and institutional factors were responsible for underlying food insecurity in the study area. Hence, the main objective of this study was to assess households' food insecurity in Mesela Woreda, Oromia Regional State, Ethiopia. For this study, three *Kebeles* (*Beha Biftu*, *Aba Aman* and *Raha*) were selected on the basis of their agro ecological zone. 194 sample households were randomly selected and interviewed. The study used both primary and secondary data sources. A structured questionnaire was used to collect data. The collected data were analyzed using descriptive and inferential statistics. In order to determine the current status of household food insecurity a household total production was collected using a modified version of the regional food balance model and converted to kilocalorie and then divided to household size.

The mean calorie intake per adult equivalent (kilocalorie/AE) for the overall sampled households was 1256.84. The finding of the study shows that the mean calorie intake per adult equivalent for food insecure households was 1104.04 kilocalorie per AE, whereas for food secure households was 3080.54 Kilocalories per AE. There is a highly significant mean difference between the food insecure and food secure household ($t=-10.757$, $p=0.00$). Thus, the study area could be classified as food insecure given the fact that majority (92.3%) of the surveyed households were not getting the minimum daily energy requirement for an individual to live healthy life. The households' food insecurity status was determined by a combination factors and both the descriptive and logit model result showed that food insecure households were more likely to have large family size, small land holding, younger age, small number of livestock ownership, illiterate and they have high dependency ratio and dependency syndrome on food aid.

However, food secure households have relatively small family size, older age, better TLU, better land holding, less literate in their education status and more participated in off/non-farm activities as compared to food insecure households. The mean family size of the respondents (6.62) was found to be larger than the 2008 Oromia region average value 4.8 (5.0 in rural areas and 3.8 in urban areas). The finding of the study also clearly shows there is a high dependency

ratio in the study area (125%). Concerning to attitude of households toward food aid, 89.7% of total respondents have dependency feeling on food aid, which shows that there is high dependency feeling on food aid in the study area. From the total sampled households, 95.4% of them were not access to irrigation and 90.7% of them were not access to credit use. In the study area households diversify their incomes through participating in various income generating activities. In the study area, households obtained their income from three major categories of livelihood activities (on-farm, non-farm, and off-farm activities). The study found out that about 91.2% of sample households did not engaged in any off/non-farm activities and they engaged in off/non-farm activities as part time activities.

Households pursue different coping strategies such as limiting size and frequency of food, borrowing and gifts from relatives and friends, selling of livestock, selling of firewood; cash for work and relief assistance to cope with food shortage. Seasonal migration is considered as an option in times of critical food shortages. In general, the analysis has different patterns. All households were not equally vulnerable to food insecurity, thus, they respond in different ways. Moreover, diversification of livestock kept, crop diversification, natural resource conservation, tree growing, growing fast maturing crops and practice of water harvesting were the main adaptive strategy for food secure households in the study area. Though water harvesting and fast maturing plants are vital strategy in drought- prone areas like Mesela, the survey result showed that it was the least used strategy in both household categories.

5.2.Conclusions

In the study area, the proportion of food insecure households is higher (92.3%) in the year during which the data was collected. According to descriptive statistics of the sample households, the averages of variables such as household size and dependency ratio were found higher for food insecure households. On the other hand, the food secure households have relatively greater averages on the land size, educational level of the head and number of livestock. 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. Households with greater farm land size showed better food security status than the less endowed households. Similarly, households who own smaller number of livestock is in a more food insecurity situation than those who have larger. 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.

Recommendation

However, the investigator believes that this is not a complete study to come up with solid solution, an effort has been made in this study in order to improve the food insecurity situation in the study area the following recommendations are forwarded:

- The fact that family size and dependency ratio cause food insecurity, attention has to be given to limit the increasing population in the study area. This can be achieved by creating sufficient awareness to affect family planning in the rural households. Even though every individual has a natural right to multiply himself with his willing partner, this right should be with the ability to furnish his descendants with all the necessary or basic needs, especially food.
- Rural households in the study area have very limited alternative sources of income. Hence, for these households to enhance their welfare in general and food security in particular, they must have diversified access to income alternatives. The findings of the study therefore lend support to the view that the off farm sector could be a viable option to reduce food insecurity among the rural-agricultural households.
- 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. Awareness creation would be done so as to minimize dependency syndrome and environmental degradation in the *woreda*.
- 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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7. APPENDICES

7.1.Tables in Appendix

Appendix Table1: Conversion factor used to compute adult equivalent (AE)

Age group (years)	Male	Female
<10 years	0.6	0.6
10-13	0.9	0.8
14-16	1.0	0.75
17-50	1.0	0.75
>50	1.0	0.75

Source: Storck, et al. (1991)

Appendix Table2: Conversion factor used to compute tropical livestock unit (TLU)

Animal category	TLU	Animal category	TLU
Calf	0.50	Donkey (young)	0.35
Weaned calf	0.34	Sheep and goat (adult)	0.13
Heifer	0.75	Sheep and goat(young)	0.06
Cow /Ox	1.00	Chicken	0.013
Donkey Adult	0.70		

Source: Storck, et al. (1991)

Appendix Table3: Conversion factor used to estimate Kcal of food items

Food item	Unit	Kcal	Food item	Unit	Kcal
Barley	Kg	3723	Milk	Lt	737
Maize	Kg	3751	Sugar	Kg	3850
Sorghum	Kg	3850	Edible oil	Lt	8964
Wheat	Kg	3623	Coffee	Kg	1103
Lentils	Kg	3522	Peas	Kg	3553
Onion	Kg	713	Tomato	Kg	216
Pepper	Kg	933	Salt	Kg	1700
Butter	Kg	7364	Rice	Kg	3330
Spaghetti/Macaroni	Kg	3550	Meat	Kg	1148

Source: EHNRI, 1997

7.2. Household survey Questionnaire

An Assessment of Households' Food Insecurity in Mesela Woreda, West Hararghe Zone of Oromia Regional State, Ethiopia

General Information

- ✓ Name of enumerator _____ Signature _____
- ✓ Name of Supervisor: _____ Signature _____
- ✓ Name of *Kebele*: _____

A, Demographic Characteristics of the Household

(Make a complete lists of all individuals who normally live and eat their meals together in this household, start from household head)

N	Name of the household members	Sex	Age	Marital status	education level	Religion	Ethnic
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

Code of each variable

Sex: Female = 1, Male =2

Marital status: Married =1 Single =2, Widowed =3, Divorced=4, Separated=5

Educational Status: Cannot read and/write=1, Can read/write=2

Religion: Muslim =1, Christian=2, others=3

Ethnicity: Oromo=1 Amhara =2 Others =3

B, Other Characteristics/ information of respondents

1.	Agro Ecology:	Dega <input type="checkbox"/>	WoinaDega <input type="checkbox"/>	Kola <input type="checkbox"/>
2.	What was the availability of rain fall?	Enough <input type="checkbox"/>	Too Much <input type="checkbox"/>	Too Little <input type="checkbox"/>
3.	Slope of your land:	Plain <input type="checkbox"/>	Hilly <input type="checkbox"/>	Steep <input type="checkbox"/>
4.	How do you perceive the fertility of your land?	Good <input type="checkbox"/>	Poor <input type="checkbox"/>	other <input type="checkbox"/>
5.	How many mealtimes does your family consume basic food on average in a day?	One time <input type="checkbox"/>	Two times <input type="checkbox"/>	Three times <input type="checkbox"/>

Yes or No response questions

No	Questions	Responses	
		Yes	No
6.	Do you think that food aid is important? (Ask if the household is the beneficiary)	<input type="checkbox"/>	<input type="checkbox"/>
7.	What is the size of your farm land? in local unit _____ in hectare _____		
8.	Have you land tenure secured?	<input type="checkbox"/>	<input type="checkbox"/>
9.	Do you have farm oxen?	<input type="checkbox"/>	<input type="checkbox"/>
10.	Did you participate in safety net programs?	<input type="checkbox"/>	<input type="checkbox"/>
11.	Are you member to community organizations like <i>Afosha</i> , self-helping groups like <i>Guzaetc</i> ?	<input type="checkbox"/>	<input type="checkbox"/>
12.	Do you have the road that connects your village to the nearest town?	<input type="checkbox"/>	<input type="checkbox"/>
13.	Do you have accessibility to the market?	<input type="checkbox"/>	<input type="checkbox"/>
14.	Do you have the credit services that facilitate your agricultural practice such as giving loan?	<input type="checkbox"/>	<input type="checkbox"/>
15.	Do you have access to irrigation?	<input type="checkbox"/>	<input type="checkbox"/>
16.	Do you have access to extension services/advisory services of DA?	<input type="checkbox"/>	<input type="checkbox"/>
17.	The number of months what you produced last: _____		

18. What types of cereal crops did you produce?

types of cereal crops		Maize <input type="checkbox"/>	Wheat <input type="checkbox"/>	Barely <input type="checkbox"/>	Teff <input type="checkbox"/>	Sorghum <input type="checkbox"/>	Groundnut <input type="checkbox"/>	Peas <input type="checkbox"/>	Beans <input type="checkbox"/>
Amount of production in	Local unit								
	Kg								

19. What types of livestock do you have?

Types of livestock	Cow <input type="checkbox"/>	Bull <input type="checkbox"/>	heifer <input type="checkbox"/>	Sheep <input type="checkbox"/>	Goat <input type="checkbox"/>	Horse <input type="checkbox"/>	Donkey <input type="checkbox"/>	Mules <input type="checkbox"/>	Camel <input type="checkbox"/>	Chickens <input type="checkbox"/>
Qt. In No										

20. During which months the shortage (deficit) occurred? Show them in their order of severity.

May	June	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C, Households' livelihood strategies

21. What is the Source of your income?	estimated income(in Birr)	
	per Month	per Year
Income from farm activities		
a. Income from Sale of Crop production		
b. Income from Sale of livestock and their product		
Income from off farm activities		
c. Income from daily wage labor		
d. Income from Sale of fire wood or charcoal		
e. Income from Sale of grass or fodder etc		
Income from non-farm activities		
f. Income from Hand craft activities(Weaving /spinning, Carpentry, Pottery, Blacksmithing etc)		
g. Income from Petty trade		
h. Income from Traditional healers		
i. Income from Renting out pack animals		
j. Income from Mills		
k. Income from Formal salary or wages		
l. Income from Pension etc		
Total income		

D, Causes of food insecurity

22. What do you think are the main causes of the food shortage/food insecurity in your *kebele*?

1. Demographic factors	Yes	No
a. Population pressure	<input type="checkbox"/>	<input type="checkbox"/>
b. Farm fragmentation	<input type="checkbox"/>	<input type="checkbox"/>
c. Large number of dependents	<input type="checkbox"/>	<input type="checkbox"/>
2. Biophysical factors/ Natural factors		
a. Drought/ Absence of adequate rainfall	<input type="checkbox"/>	<input type="checkbox"/>
b. Poor soil fertility and Soil erosion	<input type="checkbox"/>	<input type="checkbox"/>
c. Rugged topography and Stoniness of farmland	<input type="checkbox"/>	<input type="checkbox"/>
3. Economic factors		
a. Lack of farm oxen	<input type="checkbox"/>	<input type="checkbox"/>
b. Lack of cash income,/off farm income	<input type="checkbox"/>	<input type="checkbox"/>
c. Shortage of farm land,	<input type="checkbox"/>	<input type="checkbox"/>
4. Socio- cultural factors		
a. Dependency feeling on food aid	<input type="checkbox"/>	<input type="checkbox"/>
b. Low level of education,	<input type="checkbox"/>	<input type="checkbox"/>
c. Absence of saving tradition /extravagance,	<input type="checkbox"/>	<input type="checkbox"/>
d. Poor working habit,	<input type="checkbox"/>	<input type="checkbox"/>
5. Institutional factors		
a. Inaccessibility to roads,	<input type="checkbox"/>	<input type="checkbox"/>
b. Inaccessibility to market,	<input type="checkbox"/>	<input type="checkbox"/>
c. Inaccessibility to irrigation	<input type="checkbox"/>	<input type="checkbox"/>
d. Inaccessibility to credit services	<input type="checkbox"/>	<input type="checkbox"/>
e. Weak extension services	<input type="checkbox"/>	<input type="checkbox"/>

E, Households' response to food insecurity

23. Do you use any of the following strategies to cope up with the food shortage you faced?

1. Coping (short-term)strategies	Yes	No
a. Reduce size and frequency/number of meal per day	<input type="checkbox"/>	<input type="checkbox"/>
b. Consume seed stock held for the next season	<input type="checkbox"/>	<input type="checkbox"/>
c. sell of small ruminants and draft oxen	<input type="checkbox"/>	<input type="checkbox"/>
d. borrowing of cash / food from better-off neighbors and/or relatives	<input type="checkbox"/>	<input type="checkbox"/>
e. Consume Wild Food/plant and animal	<input type="checkbox"/>	<input type="checkbox"/>
f. daily wage labor	<input type="checkbox"/>	<input type="checkbox"/>
g. sell of firewood, charcoal	<input type="checkbox"/>	<input type="checkbox"/>
h. receiving relief aid	<input type="checkbox"/>	<input type="checkbox"/>
i. withdrawing children from school	<input type="checkbox"/>	<input type="checkbox"/>
j. Migration	<input type="checkbox"/>	<input type="checkbox"/>

2. Adaptive(long-term) Strategies		
a. diversifying crops	<input type="checkbox"/>	<input type="checkbox"/>
b. diversifying livestock	<input type="checkbox"/>	<input type="checkbox"/>
c. Natural resource conservation	<input type="checkbox"/>	<input type="checkbox"/>
d. Fruits , vegetables and Tree growing	<input type="checkbox"/>	<input type="checkbox"/>
e. Growing fast maturing and drought resistant plants	<input type="checkbox"/>	<input type="checkbox"/>
f. Water harvesting techniques	<input type="checkbox"/>	<input type="checkbox"/>

7.3.Guideline for Key Informant Interview /KII

Dear respondents;

My name is Anuar Mohammed. I am a postgraduate student at Haramaya University College of Social Sciences, School of Geography and Environmental Studies. Currently, I am writing my thesis on the assessment of households' food insecurity in Mesela Woreda, Western Hararghe Zone; Oromia Regional State. You have been selected purposely from different experts in Mesela Woreda. The responses you give are valuable and will be held in utmost confidentiality and will be used only for the analysis of this research. You are honestly requested to respond to any following questions.

Thank you in advance for your cooperation!!

Name _____

Position/profession _____

General Questions

1. Is there food insecurity problem in the area? What did you say about food insecurity in woreda? _____

2. What can be its causes? _____

3. What are the local coping mechanisms used in your area/*woreda*? _____

