

FACTORS AFFECTING RURAL HOUSEHOLD FOOD SECURITY: THE  
CASE OF GURA DAMOLE WOREDA, BALE ZONE, OROMIA  
REGIONAL STATE OF ETHIOPIA

MA THESIS

BY: YONAS TIRUNEH

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Factors Affecting Rural Household Food Security: in Case of Gura  
Damole Woreda, Bale Zone, Oromia Regional State of Ethiopia

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Requirements for Masters of Art Degree in Geography and Environmental  
Studies

By

Yonas Tiruneh

Major Advisor: Admasu Bogale (PhD)

Co-Advisor: Awol Akmel (PhD)

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Haramaya University, Ethiopia

## **APPROVAL SHEET 1**

The undersigned certify that they have read and his by recommend to the Haramaya University to accept the thesis submitted by Yonas Tiruneh and entitled “Factors Affecting Rural Household Food Security Situation: The case of Gura Damole Woreda Bale Zone Oromia Regional State of Ethiopia.” in partial fulfilment of the requirements for Masters of Art Degree in Geography and Environmental Studies.

Name of Major Advisor: Admasu Bogale (PhD)

Signature \_\_\_\_\_

Date \_\_\_\_\_

Name of Co-Advisor: Awol Akmel (PhD)

Signature \_\_\_\_\_

Date \_\_\_\_\_

## APPROVAL SHEET 2

We, the undersigned, members of the board of examiners of the final open defence by Yonas Tiruneh have read and evaluated his thesis entitled with Factors Affecting Rural Household Food Security Situation: The case of Gura Damole Woreda Bale Zone Oromia Regional State Ethiopia and examined the candidate. Therefore, we recommend that the thesis requirement for Masters of Art Degree in Geography and Environmental Studies in Gura Damole Woreda Approved by Thesis Examining Board.

Members of the Board of Examiners	Name	Signature	Date
Chairperson			
Advisor			
Internal Examiner			
External Examiner			

## STATEMENT OF THE AUTHOR

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Name: Yonas Tiruneh

Signature: \_\_\_\_\_

Date \_\_\_\_\_

## **BIOGRAPHICAL SKETCH OF THE AUTHOR**

My name is Yonas Tiruneh I was born in 1976 from my parents Ato Tiruneh Deboch and Kokebe Zeleke in, Ginnir Woreda, East Bale zone, Oromia Woreda state and Southeast Ethiopia. I have been learning from grade one up to grade eight in Mokria Tesema primary school and I have joined to Ginnir senior secondary school in 1998 and I have finished in 2001. Finally, I joined to Madda Welabu University in 2006 and I have graduated BA Degree with Geography at 2009 from Madda Walabu University. Since, 2009-2014 I am working in Oromia Woreda Bale zone Gura Damole Woreda Raitu Secondary School as Geography teacher. Furthermore, I am learning my MA in Geography and Environmental Studies by the sponsor of Ministry of Education at Haramaya University.

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## **ABBREVIATIONS AND ACRONYMS**

CFC	Committee on World Food Security
DA	Development Agencies
ESRC	Economic and Social Research Council
FDRE FSS	Federal Democratic Republic of Ethiopia Food Security Strategy
FAO	Food and Agricultural Organization
GTZ	German Technical Co-operation
HDI	Human Development Index
ICESCR	International Convention on Economic, Social and Cultural Right
MDG	Millennium Development Goal
NCS	National Census Report
NGO	Non-Government Organization
PPP	Per chasing price parity
PRS	Poverty Reduction Strategy
PSNP	Productive Safety Net Program
UN	United Nation
UNDP	United Nation Development Program
UNEP	United Nation Environment Program
UNICEF	United Nations Children Fund
WB	World Bank
WFP	World Food Program

## ABSTRACT

*Transitory and chronic food insecurity is severe in Ethiopia. Thus, identifying and analysing those elements that are responsible for variation in household food security status are needed to guide policy decisions, appropriate interventions and integrated efforts to combat food insecurity. In this thesis an attempt is made to assess food security status and its determinants in Gura Damole Woreda Bale zone Oromia regional state by using primary and secondary data. For this purpose descriptive statistics, binary logit were used. Two stages random sampling procedure was used to select two kebeles and 168 sample respondents from a total of 15 kebeles. The survey result revealed that 42.6% of sample farmers were food secure and 57.7% were food insecure without hunger. The binary logit model results make known that among 8 explanatory variables included in the model, three were found to be significant. These significant variables include family size, age of household head and market distance. The evidence of ordered logit model reveals that variables like family size, age of household head and market distance were significant determinants of rural household food security status. Identifying and understanding factors that are responsible for rural household food security status and its determinants is important to combat food security problems at the household level. The study findings suggest that in selecting priority intervention areas, the food security strategy should consider statistically significant variables as the most important areas.*

**Key Words:** Food, Factors, binary logit model, rural households, and Gura Damole Woreda

## 1. INTRODUCTION

### 1.1. Background of the Study

Food security has become a crucial agenda all over the world because food is a very fundamental human right that transcends cultural, political background and religious beliefs (Hadiprayitno, 2010). In addition, the right to food is acknowledged in universal declaration of human rights as well as the international convention on economic, social and cultural rights (ICESCR) which bring consequence to the state to ensure right to food which consists of obligation to respect, protect and fulfil (Hadiprayitno, 2010).

Despite progress witnessed in reducing poverty in some parts of the world over the past couple of decades, dealing with persistent rural poverty has continued to constitute the economic development agenda of Sub-Saharan Africa (IFAD, 2010). The Woreda in the most vulnerable Woreda to food security, in which about half of its population in food insecurity (Shapouri *et al.*, 2009).

Ethiopia is predominantly an agricultural country and agriculture plays a major role in the country's economy. Agriculture accounts for about 45.5 % of GDP, 85 % of the employment and 94% of Ethiopia's exports (NBE, 2017). Rapidly growing population, environmental degradation and low agricultural production and productivity are major problems facing the country. The government of Ethiopia is currently giving sufficient attention to strategies of achieving food security and poverty reduction. Ethiopia is one of the largest countries in Africa, and the third most populous. Its per capita income, however, is among the lowest in the least developed countries and depends heavily on smallholder agriculture. Low agricultural production leads to low income and the lowest calorie intake of 1,845 Kcal per person per day (Aseffa Abreha, 2018).

The main reasons mentioned for food shortage were: low agricultural production, lack of skill and technology to use the available resources, lack of self-motivated people, low level of capacity, environmental degradation, food aid induced dependency syndrome, lack of regional food security strategy, population pressure, market failure, absence of saving habit, lack of infrastructure etc. (OXFAM-Canada and WIBD, 2017). Although food self-sufficiency has remained the stated goal of the Government of Ethiopia, the problem of food insecurity has continued to persist in the country. Many rural households have already lost their means of livelihood due to recurrent drought and crop failures (Ayalneh Bogale, 2019).

Defining and interpreting food security and measuring it in a reliable, valid and cost-effective ways have proven to be stubborn problems facing researchers and programs intended to monitor food security risks (Maxwell, 2016). Measures of consumption, poverty and malnutrition are all used as proxy measures, and indicators of assets and income are used as more vague determining factors. All are related to food security, yet none of them capture the concept accurately, none of them get at the crucial issue of vulnerability (Maxwell and Frankenberger, 2016; Haddad *et al.*, 1994; Chung *et al.*, 2017). The demand for the means of measurement of food security is higher today than ever, not only in research and policy arenas but also in programs that support vulnerable groups and improve food security through targeting program management and monitoring/evaluation (Maxwell *et al.*, 2019).

In general, Ethiopian government implements poverty reduction strategy (PRS). Examination of food insecurity at Woreda, zonal or household levels to identify the specific characteristics, of the problem is crucial. Having this background, this study tries to investigate the food security situation and its factors in rural household in Gura Damole Woreda, Bale Zone, Oromia Woreda State and Southeast Ethiopia.

## **1.2. Statement of the Problem**

Poverty, inequality and food insecurity are the most crucial and persistent problems facing humanity. As the scale of human activities expands, the capacity of ecosystems to regenerate the natural resource base becomes an increasingly binding constraint to further growth and development (Kostas, 2018). The dependence of agriculture on rain fed, traditional, subsistence small holder farming that depends on methods of production where oxen-drawn local wooden ploughs and manually operated hand tools are commonly used for seed bed preparation, seeding, weeding, harvesting and threshing. Pre-and post-harvest crop loss is estimated to range from 15 to 20 % of the total annual produce (Tesfaye, 2019).

Agricultural productivity per hectare of smallholder farm land remained very low, less than one tone (CSA, 2018). The major causes of the poor performance of agriculture in Ethiopia have been (a) suppression of private sector initiatives by the former government, (b) civil war, (c) out dated production technology in the dominant peasant sub-sector and small land holding size per family, (d) unreliable rainfall and recurrent drought (e) inadequate infrastructure in the rural areas, such as poor linkage between research and extension (g) miss-guided economic policies such as a land tenure policy which were not conducive for



investment and inefficient marketing policy which made the movement of food grain between regions difficult (Wolday, 2018).

While the problem of food insecurity has big diversity and multiple dimensions, which range from the global, Woreda, country, local, household to individual level. More attention is only given to the country level so far. Moreover, the various, complex and interrelated cause of household food insecurity and local responses during crisis situation are not studied in detail, especially at a household level. Thus, identifying, analysing, and understanding those elements that are responsible for variation in household food security are needed to guide policy decisions, device appropriate interventions and integrated efforts to combat food insecurity. Agriculture in the most part of the Gura Damole Woreda, where the study was carried out, is mainly backward and dominated by shifting cultivation. In order to ensure food security, the study area has established food security office. There are also other governmental and nongovernmental organizations currently working on food security issues. However, the prevalence of food insecurity and hunger among households in the study has been a long-standing challenge.

There was no official count to estimate the numbers of food insecure and hungry people so far and so there are no data available to estimate the major determinants and the extent of food insecurity directly. Hence, the researcher has taken the initiative to determine the extent of food insecurity and to identify its determinants in the study area.

### **1.3. Objective of the Study**

The general objective of this study was to assess the factors affecting rural household food security situation in case of Gura Damole Woreda, Bale Zone, Oromia Woreda State and Southeast Ethiopia.

The specific objectives of this study were:

- To determine the extent of food insecurity in the study area.
- To assess the factors that determines rural household food security in the study area.

### **1.4. Research Questions**

- What is the extent of food insecurity in the study area?
- What are the determinants of food security in Gura Damole Woreda?

### **1.5. Significance of the Study**

Accurate food security status measurement and identification of its determinants can help public officials, policy makers and service providers to assess the changing needs for assistance and the effectiveness of existing programs. Monitoring food security can help to identify and understand the basic aspect of wellbeing of the population and to identify population subgroups with severe conditions. It is useful for numerous public and private food assistance programs that operate at local levels. The study also provides directions for further research, extension and development schemes that would benefit the farming population.

### **1.6. Delimitation of the Study**

The study was carried out in Gura Damole Woreda, Bale Zone, Oromia Woreda State. There are 15 Villages in the study area. However, the study was confined to only two villages in Gura Damole Woreda. Hence, making it possible for the researcher to get relevant information from respondents the study was conducted on two Villages. Therefore, the researcher was conducting a study on two Villages namely Hokoltu and Yedi. The researcher was also select samples from village's leaders and managers, DA employees, Health extension workers and Households from the selected Villages. The concentration of study was based on socio-economic condition of the households based on factors affecting rural household food security situation of the selected Villages. The researcher was conducted this study by using both qualitative and quantitative data gathering tools. It was enabling the researcher to get a relevant picture about the title of the study using descriptive survey research method. The researcher was addressed the problem confined to the research topic. Finally, the study was delimited on factors affecting rural household food security situation in Gura Damole Woreda, Bale Zone, and Oromia Woreda State.

### **1.7. Limitation of the Study**

Some limitations were known concerning the study. The primary limitation was COVID 19 Pandemic was a big challenge for data collection, security, and lack of organized secondary data as required. Thus more attention was given to primary data specially observation and socio economic survey data that needs long time and more finance to collect and manage these data. In here, it was with these limitations in mind and with the willingness to stand corrected on matters of fact and interpretations that this study was submitted.

## **1.8. Definition of Key Term**

Agro-ecology: is the study of ecological process applied to agricultural production system Edward (2006).

Food access: is a condition related to the availability of food supply, group of people such as (ethnicities, racial, cultural and religious group) as well as individuals' access to it (FAO, 2001).

Food Insecurity: is unable to consistently access or afford adequate food (GTZ, 2006).

Food utilization: is the ability of the human body to ingest and metabolize food through adequate diet, clean water, good sanitation and healthcare to reach a state of nutritional wellbeing where all physiological needs are met Edward (2006).

Food vulnerability: is usually defined in relation to an outcome, such as hunger, food insecurity or famine (GTZ, 2006).

Household: Collectively, all the persons who live in a given house; a family including attendant, servant etc; a domestic or family establishment (UNEP, 2002).

Human capital: people's innate abilities and talents plus their knowledge, skills and experience that make them economically productive (UNEP, 2002).

Livelihood: Livelihoods can be defined as the sum of means by which people get by over time. And in which people access and mobilize resources that enable them to pursue goals necessary for their immediate and long-term survival (GTZ, 2006).

Malnutrition: is the condition caused by deficiencies or imbalance in energy, protein and/or other nutrients (FAO, 2001).

Undernourishment: is when there is insufficient energy intake (UNEP, 2002).

## **2. REVIEW OF RELATED LITERATURE**

### **2.1. The Concept and Definition of Food Security**

The concept of food security is broad, diversified and dynamic. The rationale behind this is varied geographical, social and economic set up of the world communities that tend to understand the concept differently (Hussein, 2006). To emphasize the multi-dimensional and complicated nature of food security FAO (2003) explained it as “Food security is multi-faceted concept variously defined as interpreted. At one end of the spectrum food security implies the availability of adequate supplies at a global level and national level; at other end, the concern is with adequate nutrition and well-being. “Edward (2006) also stated that significant transformation is seen in the conceptual life time of food security due to the dynamic nature of the concept.

Food security is defined as ensuring that all peoples of all time have both physical and economic access to the food they need and it exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary need and food preferences for active and healthy life (FAO, 2007). In general, the recent concept of food security has given more attention to households and individuals than its availability at international, national and Woredaal levels. This is because, as it had been indicated here in before, increasing food production, supply and sufficiency at broader levels do not necessarily ensure that each and every individual is food secured. This is why, as reported by the WFP (2009), over 1 billion people throughout the world have been suffering from hunger and malnutrition despite the fact that there is more than sufficient food supply at global level at present.

### **2.2. Household Food Security**

The most comprehensive definition, of household food security comes from FAO (2010). According to which Fusty exist when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary need and food preference for an active and reality life.

### **2.3. Major Components of Food Security**

The concept of food security can be seen in terms of four major components, as out lined by the world food program (WFP). These components are: Availability of food, Access of food individuals and households utilization, which has to do with a person’s ability to select the

food that they prefer, as well as absorb the nutrients in the food vulnerability of the individuals to future shocks (WFP, 2002).

Food Availability: is refers to when sufficient quantities of food are consistently available to all individuals with in a country or a Woreda. Such food can be supplied through production, other domestic output, or commercial imports or food aid (GTZ, 2006).

Food Access: depends largely on household purchasing power, which varies in relation to market integration, price policies and temporal market conditions (UNEP, 2002).

Food utilization: refers to person's ability to select the food that they prefer, as well as absorb the nutrients in the food. Effective food utilization depends, largely, on knowledge within the household of food storage and processing techniques, basic principles of nutrition, and proper childcare and illness management (WFP, 2002). Food Vulnerability: of the individual to future shocks, individuals should not be at risk of losing access to food as a consequence of a shock (WFP, 2002).

#### **2.4. Major Factors that Affect Food Security**

Demographic factors create vulnerability when size of population exceeds the carrying capacity of a particular area. And have an influence on food security status of households. The majority of farm households in Ethiopia are small-scale semi-subsistence producers with limited participation in non-agricultural activities. Because 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) as food requirements increase in relation to the number of persons in a household.

Environmental factors can create chronic vulnerability in several ways. People living in areas where the natural resource base is poor or deteriorating often have limited opportunities for earning their livelihood. Household risks of food insecurity and famine greatly increase long term security decline in resource endowment combined with unfavourable developmental policies. The combined effects of land based resources degradation like deforestation, soil erosion, loss of agricultural and pasture land leads to production decline (Getachew 1997). In Ethiopia rapid population growth and poverty, are causing serious resource degradation (Markos 1997, Osman 2003 and Fasil, 2005).

Economic factors can affect the food security situation of national, Woredaal and local levels of populations, such as food prices, interest rates, inflation rates, labor market conditions, foreign exchange rates, and trade balances. Economic factors can also create vulnerability on food security, if assets and resources are distributed inequitably among population of all levels (CFS, 1999)

Political factors can affect food security positively or negatively. Positive political factors can encourage people's participation to reduce the vulnerability food security, such as providing basic infrastructure such as, transport, school, health services, electricity, water supply, market. And other services But, the presence of civil conflict can restrict all the required services and enhance the vulnerability of food security, and may lead to loss of assets, destruction of social and physical infrastructure, and even displacement people from their homes for affected households. Armed conflict and civil strife were major sources of food insecurity (FAO, 2000).

Socio cultural factors like basic social services and prevailing social attitudes have a very important influence on vulnerability of food security. Such as low level basic social services, like primary education, health care centers and extension services, serious undernourishment is less likely to be found. People's traditional attitudes influence the kinds of food security. 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 that particular community (CFS, 1999).

## **2.5. Interrelationships of Food Security, Availability Access and Utilization**

Renzaho and Mellor (2010) present the relationships, interactions and interconnections between food security, food availability, access and utilization. Food availability, food accesses and food utilization combined affect food security status. Food availability and food accesses themselves are influenced by various internal and external factors. These factors are the determinants of the household's access to resources, volume of production and storage. Absorption capacity of the body which can be manifested through the demand varieties, dietary composition and health aspects has significant impact on the level and ability of the body to utilize a given food. These three factors all together affect food security status, FAO (2013) stated that dietary or calorie intake is one measure of food security that captures availability and access dimension. There for, taking in to consideration all these points in

relation to the available data source, the study opts to use the disappearance methods as a means to compute the per capital per day calories consumption.

## **2.6. Food Security Situation in Africa**

In Africa, food has become the most important item in any discussion of the development the last three decades. The evolution of the problem varied in different parts of sub-Saharan African countries (Angola, Chad, Ghana, Malawi, Mozambique and Namibia) the proportion of undernourished substantially decreasing with other has gone through a deterioration process (Kidane et al 2006). About 80% of the increase in the proportion of the undernourished is absorbed in conflict countries, where famine has been wide spread, resulting from continuing poverty, transitory emergency related food insecurity, which occurs in periods of intensified pressure caused by natural disasters, economic collapse or conflict (FAO, 2004).

## **2.7. Cause of Seasonal Food Shortage**

The major cause of food security in Africa is the under developed and underperforming agricultural sector that is characterized by over-reliance on primary agriculture, low fertility soils, ecological degradation, significant food crop loss both pre and post-harvest, social and gender inequality, poor health status, natural disasters and inadequate food shortage of preservation that result insignificant commodity price fluctuation (Mwaniki, 2005). All factors can be related in some fashion to two basic causes: insufficient national food availability and access to food by households and individuals. The study by Mwaniki (2005) the root cause of food insecurity in developing countries is inability of people to gain access to food due to poverty. A study conducted by Obamiro et al (2003) in south western Nigeria showed that illness will decrease productivity; there for increases in days loss to illness will decrease food availability and accessibility. As a result illness will likely shift family members from the food secure to the food insecure status.

## **2.8. Food Security Situation in Ethiopia**

Ethiopia is among the poorest and most food insecure countries of the world. As Human Development Index (HDI) of the United Nations Development Program (UNDP) indicates it rank one hundred seventy one out of 174 countries in the world and about 60% of its population lives below poverty line (FAO, 2001). In terms of food security, it's one of the seven countries that constitute half of the food insecure population in sub-Saharan Africa (Sisay and Tesfaye, 1995). Average caloric intake in rural area in 1,750 calories /person/day

(FAO, 1998), which is far below the recommended minimum daily intake of 2100 calories/person/day. As a result, about 51% of the populations are undernourished (FAO, 2001). In Ethiopia increasing unemployment in rural areas, severe shortage of land holdings exacerbated by rapid population growth, decline in soil fertility through erosion, low growth due to inappropriate development policies, and recurrent drought in parts of the country are among the most important contributory factors for the increasing food insecurity in the country that is why in most instances food security turns out to be famine and catastrophic food hunger when there is short fall.

The food security situation in Ethiopia has been extremely unstable due to the combination of environmental, socio-political and development instabilities. Lack of food in the household imposes inordinate strains on the daily burdens of its members. Although food security as a problem at national level was first felt in Ethiopia in the 1960's it only started influencing policy in the 1980's when food self-sufficiency was one of the objectives of the ten year perspective plan that took place after the 1983/84 drought and famine, which claimed millions of lives (Haile et al, 2005). Since the proper "transitory food insecurity" have received little considerations despite its prevalence even in "normal years" as well as "high potential" and "surplus areas". The National Policy on Disaster Prevention and Management of 1992/93 emphasized the need to give priority to disaster prevention programs in all development endeavors. The Federal Food security Strategy (FDR FSS, 1996 update in 2002) rested on three pillars: increasing supply and availability of food, improving access and entitlement to food and strengthening emergency response capabilities.

The new coalition for Food and Livelihood Security in Ethiopia adopted in 2004 aimed at improving access to long term food and livelihood security for chronically and seasonally too insecure citizens through its various food security programs. In 2005, the Ethiopian Government Launched the Productive Safety Net Program (PSNP) with the objective, of facilitating transfers of food or cash to chronically food insecure Woredas without depleting assets at household level and creating assets at community level.

## **2.9. Determinants of Food Security**

Different literatures use different proxies as a measure of food security and use different methodologies. On the grounds of that, these literatures find out various factors as determinants of food security. Some literatures show conflicting results for the same factor even if the majority seemed the same. Some of them are presented below and are used later



on to compare with the current study results. Why these conflicting results happening, may be an area of research.

For example, Greenwell and Pius (2012) in their study in Malawi, used reported food security status, a continuous dietary diversity index and food end time as measure of food security. Logistic, ordinary least square, and quintile regressions were used as an estimation method. This study found that household food security is determined by credit access, age, sex of the household head, extension information, assets or wealth and education. In this literature age is found to have negative association with the food security status. The justification given is that even if young farmers tend to be less experienced, yet they are more food secure due to their dynamic and energetic nature. A study in Pakistan by Asghar and Muhammad (2013) found that household size, household income, irrigation facility, and age determine food security. In contrast to the results by Greenwell and Pius (2012), Asghar and Muhammad (2013) found that age has apposite impact on household food security and justified that experience has more weight for a household status to be in food security.

According to a study in Bangladesh by Majumder et.al (2012) profession and crop cultivated, farm size and professional support found to be significant determinant of the household food security. In this study, it seems that variables like age and other household characteristics are not controlled.

In Ethiopia context, studies on food security in different parts of Ethiopia including SNNPR, Oromia, Somali and Amhara Woredas are reviewed. All these Woredaal studies are conducted using cross-sectional data. Despite these works are carried out in different Woredas, we may need to know, if the determinants found to be similar or different.

On a study on the southern part, by Feleke et al. (2003), technology adoption, farming system, farm size, land quality, household size, off farm income and wealth are considered to be determinants of food security and all except wealth and off farm income are found to be significantly determining food security. This study basically categorized the determinants in to supply and demand side factors. The factors which were said to be demand side are household size, per capita aggregate production and access to market. The result pointed out that supply side factors which include technological adoption, farming system, farm size and land quality, are more powerful than the demand size factors in determining food security status of the farm household in the Southern Ethiopia. What is lacking in this study is, rainfall

shock which is usually thought to have significant impact on food security in Ethiopian context is not controlled.

Unlike the study by Feleke et al. (2003), Demeke (2011) assessed the impacts of rainfall shock in the farm household food security in Ethiopia and found out that rain fall shock significantly affects food security. Even if this work is on impacts of rain fall shock, other factors which were justified to have impact on food security of a household are controlled.

Much of the literature on seasonal food insecurity analyzed factors that influence seasonal food insecurity of rural farm households using appropriate regression models. Ramakrishna et al (2002) made an assessment on food insecurity situation in North Wollo Zone of Ethiopia. A food balance sheet was constructed and food security causation was examined using a binary logistic regression model. Accordingly, cereal production, educational status of the household head, fertilizer consumption, household size, land size and livestock where found to be the most determining factors of household food security.

As a study by Kidane et al (2005) reported the cause of household food insecurity in koredegaga peasant association, Oromia Zone. The study showed the determinants of household food insecurity using a logistic regression procedure. As a result, farmland size, ox ownership, fertilizer application, education level of household heads, household size and per capital production were found to be significant predictors. Oromia Woreda is one of the food insecure Woredaal states in Ethiopia. Similarly, in the study area, GuraDamole Woreda, the major economic activities are both pastoral and agro pastoral economic activities, however, a number of people suffered by food insecurity and depend on food aid in a regular base.

## 2.10. Conceptual Framework

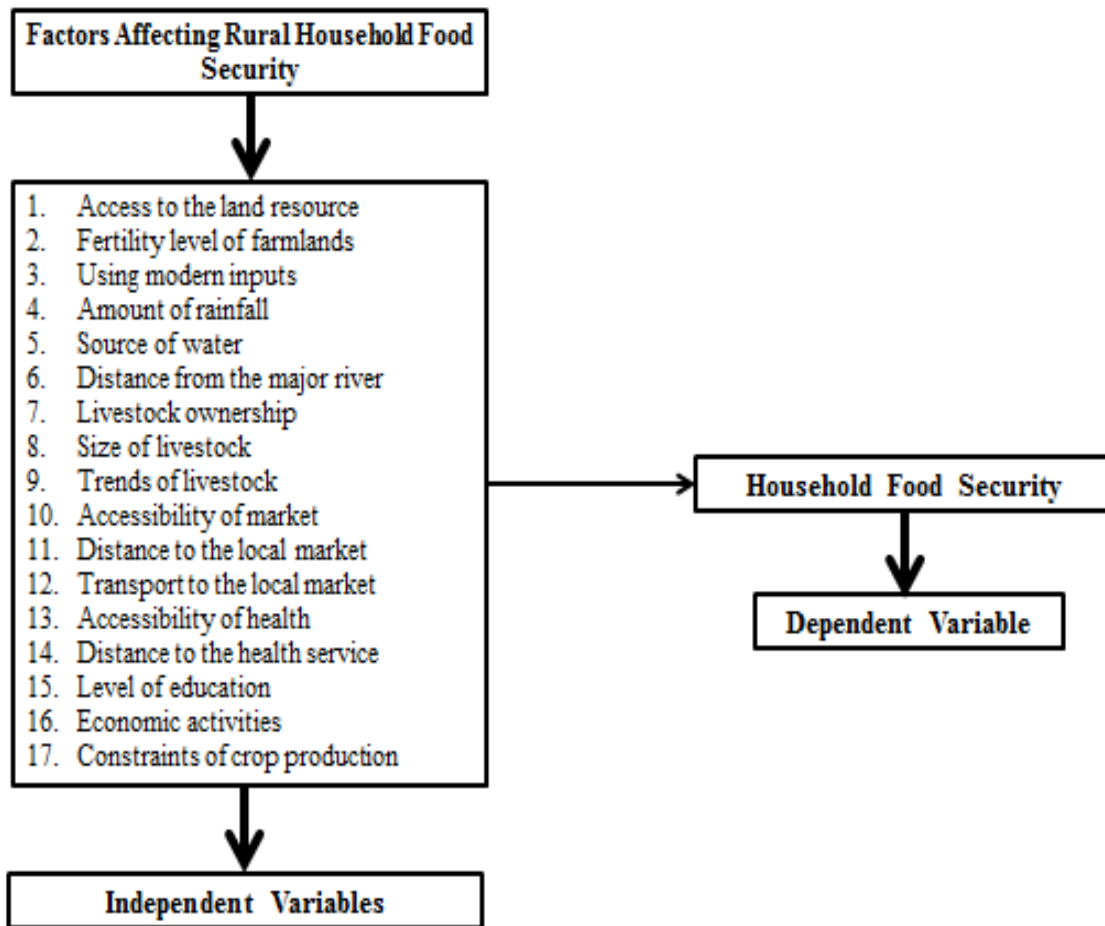


Figure : Conceptual Framework

Source: Own Design, 2020

### 3. RESEARCH METHODOLOGY

#### 3.1. Description of Study Area

##### 3.1.1. Location

The study area was conducted in Gura Damole Woreda, Bale Zone, Oromia Woreda state and Southeast Ethiopia. Its located 121 km away from the city of Robe and about 551km from capital city of the country Addis Ababa (Fig. 1)

Gura Damole Woreda was one of the Woredas of Bale Zone, Oromia Woreda State. its bordered on the South by the Somale Woreda state, in the West by Delo Mena Woreda and Berbere Woreda, in the North Goro Woreda , and in the East by the Dawe Kachen Woreda. The administrative center of the Woreda was Jibri town and the geographical location was found between 5° 43' 30"and 6° 57' 0" N and 40° 9' 0" and 40° 51' 0" E.

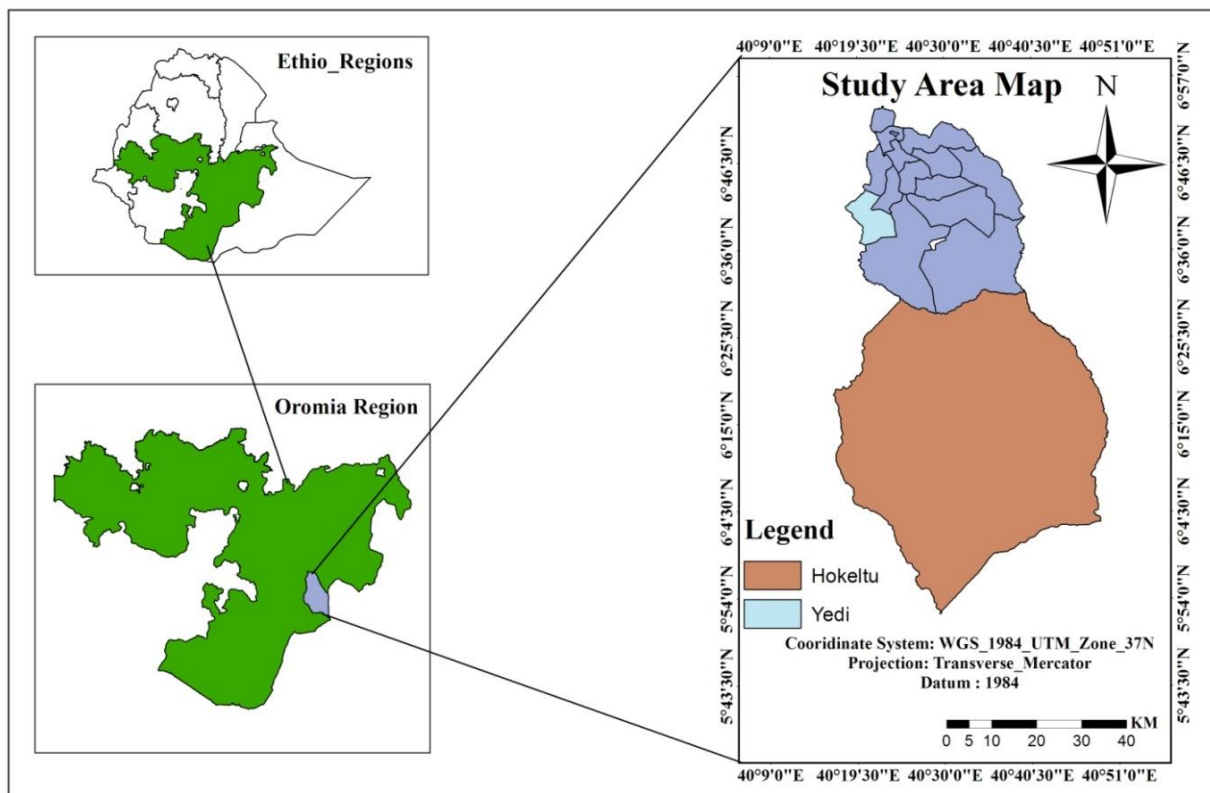


Figure : Map of the study area

The Gura Damole Woreda was administratively divided into 15 woredas. The elevation ranges from 900 to 1900 masl. Three agro climatic divisions of the Woreda are low land (75%), midland (24%) and highland (1%) (Gura Damole Woreda Agriculture and Natural Resource Office, 2020).

### **3.1.2. Climate**

The study area was characterized by a bimodal rainfall. According to the classification of rainfall regimes given by National Meteorological Service Agency, Gura Damole Woreda is characterized by a wet season from June to October; with an altitude of 1,550 masl has an average annual precipitation of 900 mm (NMA, 2020).

Temperature reaches a daily maximum of 25-38C in the dry season. The hottest period is from December to April. The minimum temperature ranges from 120C to 200C depending on season and altitude (NMA, 2020).

### **3.1.3. Population**

The 2013 CSA estimated report indicated that, the population of Gura Damole Woreda is projected to be 38, 125. Of which, about 19, 479 are Male whereas, 18, 646 are Female. With 6,925 household out of these the 6sites covers 1,578 households (Gura Damole Woreda Agriculture and postural development office profile, 2018).

### **3.1.4. Religion**

Religion in the Woreda is classified and presented, majority of the population are Muslim (about 99.5%). Next, to Muslim Orthodox Christian and Protestant accounts about 0.5%. There is no conflict among different religion followers. Therefore, food insecurity due to religion conflict is not observable. Food source and feeding habit of all religion is basically similar.

### **3.1.5. Settlement Structure**

Based on the 2018 Population and Housing Census, 98.2% of the population lives in rural areas where as the urban population accounts about 1.8%. The majority of the population lives in remote and inaccessible areas. Moreover, the settlement pattern is still much scattered. These conditions make it very difficult or impossible to supply people with services and infrastructure.

### **3.1.6. Geomorphology and vegetation types**

The undulating topography of the Woreda lands characterized by diverse geomorphologic features. The Woreda is characterized by plain and hilly topography was rugged, highly dissected by deep valleys and river gorges that have western drainage system. Unpublished data from the Woreda agricultural office indicates that 50% of the land area was plain followed by 28% hilly, 5% cliffs and 25% other topographic features. With respect to soil

type, 60% of the soil belongs to red soil followed by 20% black soil, 15% gray soil and the remaining 5% belongs to others (Personal communication with the Woreda Agricultural office, 2019).

The natural vegetation of the study area belongs to the dry evergreen montane vegetation type (White, 1983; Tamirat Bekele, 1993); Friis and Sebsebe Demissew 2001). The area is dominated by remnant trees such as *Acacia abyssinica*, *Cordia africana*, *Croton macrostachyus*, *Erythrina brucei*, *Ficus species*, *Hagenia abyssinica*, *Juniperus procera*, *Podocarpus falcatus*, and others. Moreover, the western extremes of the Woreda are characterized by dense impenetrable scrublands and Acacia woodlands (Tamirat Bekele, 1993).

### **3.1.7. Farming Practice**

The economic activity of the local community is based on agriculture (crop production and animal husbandry). But the area highly depends on animal husbandry. The common domestic animals are Camel, Cattle, Goat, and Donkey. The common crop productions are Maize, Wheat, Barley, and Sorghum (Gura Damole Woreda Agriculture and postural development office profile, 2018).

The agricultural system of Gura Damole Woreda is predominantly a cereal farming system (GDDAPDO, 2018). The crops are mainly cereals, pulses and oil crops with root crops generally being of minor importance. On the other hand, integration between crops, livestock and trees is very weak compared to other agricultural systems. Livestock provides draught power, but manure is not important in the cropping system (GDDAPDO, 2018).

### **3.1.8. Economic activities and Sources of livelihood**

Regarding to livestock herding like traditional oxen fattening are very important practice supporting the Livelihood of the farmers and also bee keeping is being practiced (Gura Damole Woreda Agriculture and postural development office profile, 2018).

Depending on the location, local people must travel for 1to 4 hours to reach market places. The nearest large market beyond Raitu Anole is in the Gura Damole Woreda, Goro in the Goro Woreda, Haro Dumal and Bele in the Berbere Woreda (Gura Damole Woreda Agriculture and postural development office profile, 2018).

### 3.1.9. Expenditure and Consumption

The Central Statistical Authority (CSA) report on 2013 household income, consumption and expenditure survey of the Woreda revealed that average value of expenditure for all items was Birr 5021.70 per household and Birr 1176.44 per person, which is almost equivalent to the national poverty line (Birr 1075.03). Expenditure for different items in the rural part of Gura Damole Woreda is described in Table 1.

Table : Average value of expenditure in rural part of Gura Damole Woreda

Items	PHH	PP	Percentage
All Items	5021.7	1176.44	100
Medical care and health expense	41.44	10.59	0.83
Clothing and foot wear	484.87	107.89	9.66
None consumption expenditure	404.41	88	8.05
Food and other non-food items	4090.98	969.69	81.46

PHH: Per Household, PP: Per Person Source; CSA, 2018

### 3.2. Research Design

For the present study researcher was used in general quantitative research design. Particularly it was utilizes co-relational research design in investigating the Factors Affecting Rural Household Food Security of the study area. This method was helping the researcher to find out the factors affecting of the independent variables on the dependent variable (Impacts on Food Security). Descriptive and explanatory designs were used to produce information from the quantitative data. A survey is a means of gathering data, as it allows the identification and investigation of relationship patterns among variables (Creswell, J. W., 2019).

In this regard, descriptive research design was used to describe the Factors Affecting Rural Household Food Security of the study area; whereas descriptive design was employed to examine the effects of the independent variables on the dependent variable of the study. In order to provide the research study, both qualitative and quantitative data types were used. Moreover, in order to make the study more accurate and reliable through triangulation (cross checking purpose), the researcher was use both qualitative and quantitative types. The research was conducted using quantitative and qualitative data collection technique. In order to present a wide range of information, both primary and secondary data sources were also used in the study to full fill the limitation one over another. So, since the researcher was used

both qualitative and quantitative data collection and also used by primary and secondary data collection methods for the reality of this study.

Primary data was collected from the respondents through a well devised questionnaire (open ended questioner) which has obtained from identified the residents who live in the selected study sites. Here different group of respondents were used to collect primary data. Secondary data was reviewed and analysed from related books, journals, magazines, working papers, websites, and previous reports were used by the researcher as a secondary data sources. As well as, statistical and unpublished documents of Woreda government office have been used by the researcher.

### 3.3. Data Collection Methods

#### 3.3.1. Selection of the Sample Size and Sampling Design

The study sites were selected by purposive sampling procedure based on, accessibility and availability of the Factors Affecting Rural Household Food Security. Following this, the total sample size was determined using probability proportional to sample size-sampling technique by Yemane, (1967).

$$n = \frac{N}{1 + N(e^2)} \dots \dots \dots (1)$$

Where: n = sample size; N = total number of households in three sites; e = maximum variability or margin of error 5% (0.05); 1 = the probability of the event occurring.

Total sampled households:

After the sample size determined to 168 household individuals for study sites, by using stratified statistical formula semi sample size determined for each two sites.

$$N = N_1 + N_2 \dots \dots \dots (2)$$

$$P_1 = \frac{N_1}{N} \text{ and } P_2 = \frac{N_2}{N} \dots \dots \dots (3)$$

$$n_1 = n * P_1 \text{ and } n_2 = n * P_2 \dots \dots \dots (4)$$

Where: - N = Total household of the 2 sites, N<sub>1</sub> = subtotal of the household of Yedi, N<sub>2</sub> = subtotal of the household of Hokoltu, P<sub>1</sub> and P<sub>2</sub> = Ratio of each subtotal household to total household of the three sites, n<sub>1</sub>, and n<sub>2</sub> = semi sample size of each three site, n = Total sample size determined for all two sites (Table 2).



Table : Distribution of HH population in the study sites

No	Name of Sites	Total no of households	Sampled no of households	Sampled no of households in %
1	Yedi	174	97	57.70%
2	Hokoltu	127	71	42.26%
	Total	301	168	100%

Household individuals were selected by using the criteria of the three wealth categories (poor, medium and rich) were used to classify pastoralist into three wealth categories of households for conducting a formal survey. Criteria's had such as land size, types of house, livestock owned, dependency on selling charcoal production and others.

### 3.3.2. Socio-Economic Data Collection

Data collected from the various sources and types, the researcher was used different data collection methods such as (types and sources), questionnaires survey, key informant interviews, Focus group discussion, and field observation was tools of data gathered for this study.

Data was collected by means of a semi structured questionnaire modified from Newmark *et al.*, (2014). The questionnaires were administered to households. The questionnaires were designed to understand the Factors Affecting Rural Household Food Security in the two study sites. The questionnaire were administered to pastoralists at a random manner based on first come first serve basis Newmark *et al.*, 2014), and alternating male and female respondents as much as possible and different age groups.

To select key informants, village guided tours with chairman of peasant association and extension agents took place at each sites and 15 key informants five per each sites were selected. The focus group discussion participants are selected on the basis of their familiarity and unique knowledge of charcoal production activities and 6 focus group discussions (FGDs) five per each sites were consisted of six to eight members were selected.

### 3.3.3.. Procedure of Data Collection

To get relevant information as much as possible the researcher firstly contacted the selected Kebele and Woreda' forest and environmental sanitation agency office for the successful accomplishment of the study. Then after, the Kebele leaders, DA employee, Actors, Government and were informed about the purpose of the study in detail and they was given adequate information for unclear ideas that the respondent raised.

To get the actual fact, the researcher were requested the respondent to fill all the necessary information and their feelings as well. After all respondents filled the questions and back to the researcher for analysing the data. At the end, the researcher collected all the information filled by the respondents and were analysed it in accordance.

### **3.4. Data Analysis**

The quantitative socio-economic data were analysed using descriptive statistics such as %age, frequency, standard deviation, standard error and mean. Moreover, the  $p =$  test was used to look at the significance differences between dependent and independent variables. Regression analysis was used to show the relationship between the socio-economic parameters and charcoal production activities. The socio-economic data were analysed using SPSS version 22 software. Both quantitative and qualitative data analysis methods were used in the study. The researcher were collected all the necessary information from questionnaire, interview, field observation and documents. The collected data were edited, coded and were processed separately for each item in a way proper to answer the research questions. The data that was collected during the study from interview, documents and open ended questionnaires were analysed both quantitatively and qualitatively.

Identifying Determinants of Food Security in this study, descriptive (such as mean, standard deviation, maximum, minimum, sum and % ages), frequencies and cross tabulation were computed. Independent Samples T-test was used for the purpose of comparison of mean differences between food secure and food insecure households.

Model specification Models, which include a "yes" or "no" type dependent variable, are called dichotomous. Such models approximate the mathematical relationships between explanatory variables and the dependent variable that is always assigned qualitative response variables. The four most commonly used approaches to estimate dummy dependent variable regression models are (1) the linear probability model (LPM), (2) the logit, (3) the probit and (4) the tobit model. They are applicable in a wide variety of fields (Gujarati, 1995).

### **3.5. Ethical Consideration**

The researcher considers issues relating to the ethical conduct of research such as informed consent, confidentiality, privacy and anonymity were upheld. Ethics is the norms or standards of behaviour that guide moral choices about our behaviour and our relationships with others. Participants and respondents were given full information on the purpose and objectives of the

study in order for them to make informed decisions as to whether to partake or not. Moreover, all information concerning the identity and personality of respondents were treated with utmost confidentiality. Additionally, all information gathered was used for the sole purpose of the research study.

## 4. RESULT AND DISCUSSION

### 4.1. Household Characteristics and Food Security

#### 4.1.1. Demographic Characteristics

Households in Gura Damole Woreda have average family size of 5.47 persons per household. The total family member of the sample was 168. It comprises of 23.8% female and 76.2% male. However, this average masks differences among households. For instance, the largest family size in number was 13 and the smallest one was 1. The sample household members less than 25 years of age accounted for 36.3 %, age members, 26 - 35 years, constituted 40.5%, age members, 36 – 45 years, constituted 22%. Thus, the remaining 1.2% of sample household members was in the age 46 - 55 years. The young dependency ratio, i.e., the proportion of persons between less than 25 years to 26 - 35 years and the old dependency ratio, the proportion of persons 46 – 55 years to that of the active age group (26 - 35) members of the sample amounted to 40.5% (Table 3).

The overall dependency ratio, the proportion of young and old to the working age group in the sample accounted to 76.78 %. This means, every most person within the economically active population groups supported not only themselves, but also additional economically dependent persons with all basic necessities. The distribution of sample household members by age group is presented in Table 3. The existence of large number of economically inactive family members could affect the food security status negatively. This is because working age population supports not only themselves, but also additional dependent members in the family Table 3.

Table : Sample household members by age group

Age	Number of family members	%
25 Years and less	61	36.3
26 - 35	68	40.5
36 - 45	37	22
46 - 55	2	1.2
Total	168	100

Source: Field Survey, 2020

Family size measured in adult equivalent was hypothesized as one of the potential variables that have negative contributions to food security. The survey result revealed that there was a significant difference in the mean family size at less than 5 % probability level between food

secure and food insecure sample household groups. The mean was found to be 3.3 and 3.32 for food insecure and food secure households respectively and their mean difference was 0.02. The overall mean family size of sample households in adult equivalent was 3.31 with standard deviation of 1.173 (Table 4).

Table : Distribution of sample households by family size in adult equivalent (AE)

Family size in AE	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
1.00-3.00 (1)	12	12.4	6	8.5	18	10.7
3.01-4.45 (2)	5	5.2	5	7	10	6
4.46-5.90 (3)	39	40.2	30	42.3	69	41.1
5.91-16.56 (4)	28	28.9	22	31	50	29.8
	97	100	71	100	168	100
Mean	3.3		3.32		3.31	
SD	1.226		1.106		1.173	
Minimum					1	
Maximum					16	

Source: Field Survey, 2020

Sexes of household head out of 168 respondents 76.2% were male-headed and 23.8% were female-headed households (Table 5). Among male-headed households 74.6% were food secure and 25.4% were food insecure. Likewise, within female-headed households 25.4% and 74.6% were food secure and food insecure respectively. In this research it was hypothesized that male-headed households are more likely to be food secure than female-headed ones, because female-headed households have less working labor availability that leads them to provide their lands for sharecropping. The Chi-square test indicated that the systematic relationship between food security and sex of household head is insignificant (Table 5).

Table : Distribution of sample households by sex of household heads

Sex	Food insecure (97)		Food secure (71)		Total (168)		X <sup>2</sup>
	Freq.	%	Freq.	%	Freq.	%	
Male (1)	75	77.3	53	74.6	128	76.2	1.474
Female (2)	22	22.7	18	25.4	40	23.8	
Total (3)	97	100.0	71	100.0	168	100	

Source: Field Survey, 2020

Level of education Understanding the level of respondents' education helps in identifying and determining the type of development approaches to be followed. The role of education is obvious in affecting household income, adoption of technologies, demographic, health and

socio-economic status of the family. Literacy rate of the sample respondents was found to be 41.1% which is better than the regional level (6%) (Table 6). It was hypothesized that as the level of education increases, the probabilities of being food secure increases. The survey result approved the hypothesis and indicated that 60.8% of the food insecure was illiterate whereas only 14.1% of the food secure was illiterate. The mean difference between the two sample groups with regard to the level of education was 1.17 and found to be statistically significant at less than 5 % probability level (Table 6).

Table : Distribution of households by level of education

Level of Education	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Illiteracy (1)	59	60.8	10	14.1	69	41.1
Primary school (2)	21	21.6	46	64.8	67	39.9
Secondary school and above (3)	0	0.0	7	9.9	7	4.2
Religious school (4)	17	17.5	8	11.3	10	6.0
Total	97	100	71	100.0	168	100

Source: Field Survey, 2020

## 4.2. Farm Production Resources, Services and Food Security

There are many economic variables that determine rural household food security. This section is devoted to the discussion of basic resources of farming households and their access and contribution to household food security. Specifically, cultivated land size, Land Productivity, livestock holding, access to various services, market distance, asset possession, soil fertility problems are analysed below.

### 4.2.1. Cultivated land size

Crop production requires primarily the availability of suitable cultivable land. Table 7 presents the distribution of cultivated land size between two groups. The total cultivated land size of sample households ranged from 0.25 to 3.50 ha. The average land size of the respondents was 1.32 ha with standard deviation of 0.56 ha. This average cultivated land size is below the national average of 1.53 ha, which is said to be sufficient to produce household food requirement. As indicated in the Table 7, 47% of the respondents have a farm size of less than 1.50 ha. The mean comparison of two groups in terms of mean cultivated land size revealed that there is significant difference between food secure and insecure households, which is 1.47 ha for food secure and 1.24 ha for food insecure households. Their mean difference was 0.23 ha and significant at less than 5% probability level. This result supports

the hypothesis that farmers who have larger cultivated area are more likely to be food secure than those with smaller land area due to the fact that there is high possibility to produce more food.

Table : Distribution of sample farmers by cultivated land size

Distribution of sample farmers by cultivated land size (Ha)	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
0.25 – 1.00 (1)	45	46.4	4	5.6	49	29.2
1.01 – 1.50 (2)	42	43.3	37	52.1	79	47.0
1.51 – 2.00 (3)	10	10.3	20	28.2	30	17.9
2.01– 3.50 (4)	0	0.0	10	14.1	10	6.0
	97		71		168	
Mean	1.24		1.47		1.32	
SD	0.544		0.564		0.56	

Source: Field Survey, 2020

#### 4.2.2. Crop production

Farmers' objectives in crop production are mainly for dietary and cash income. The major crops grown in the study area are sorghum, maize and wheat seed. The amount of crop produced in kilogram and their descriptive statistics are presented in Table 8. The annual total crop production of sample households was 132,019.50 kg from 184.59 ha of cultivated land. Even if the overall average crop production was 943 kg, it ranges from a minimum of 150 kg to a maximum of 3134 kg (Table 8). The total crop production per adult equivalent was 221 kg, which is almost equivalent to the minimum subsistence requirement recommended by national food security strategy. It doesn't mean they were food secure because they spent a lot of money for non-food expenses like medical care, education, tax, social expenses and others.

Table : Distribution of sample farmers by crop production

Total production in Kg	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
150 – 550 (1)	30	30.9	6	8.5	36	21.4
551 – 850 (2)	44	45.4	35	49.3	79	47.0
851 – 1465 (3)	23	23.7	30	42.3	53	31.5
1466 - 3134 (4)	0	0.0	0	0	0	0
	97	100	71	100	168	100
Mean	3.3		3.32		3.31	
SD	1.226		1.106		1.173	
Minimum						150
Maximum						3134

Source, Field Survey, 2020

#### 4.2.3. Livestock Holding

Livestock provide milk, meat, traction power, income and transport. Moreover, they are sold as one of coping mechanisms during food shortage. Livestock owned by the sample households include cattle, sheep and goat, camel, equine and poultry. The total livestock population owned by the sample respondents was 296.43 TLU but 32.1% of the respondents were without livestock. The maximum and minimum number of TLU was 5 and 0 respectively and the average holding was 3.07 TLU. In the study area in addition to oxen dry cows and heifers serve as traction power. Therefore, it was not necessary to consider number of oxen owned as a separate variable for this study. Food insecure households own less TLU (3.03) than food secures ones (3.11). So this survey result demonstrated that the difference between two sample household groups regarding livestock holding is significant at less than 10 % probability level (Table 9). This result supports the hypothesis that a person who owns more TLU is more likely to be food secure than the one who has less. This clearly shows that still livestock has a good contribution to food security condition regardless of major livestock production constraints like livestock diseases and feed shortage in the study area.



Table : Distribution of sample households by livestock holding in TLU

Livestock holding in TLU	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
0	32	33	22	31	54	32.1
1_2	1	1	1	1.4	2	1.2
3_5	15	15.5	11	15.5	26	15.5
6_8	30	30.9	21	29.6	51	30.4
Above 9	19	19.6	16	22.5	35	20.8
	97	100	71	100	168	100
Mean	3.03		3.11		3.07	
SD	0.159		1.573		0.121	

Source: Field Survey, 2020

Livelihood resources: are the capability of the household to attain livelihood objectives in general and household food security status in particular is depend on possession of livelihood assets (Degefa, 2005). In order to sustain the livelihood of rural household, five different forms of capital were necessary such as, Natural capital, physical capital, financial capital, social capital and human capital. But, financial capital and social capital were not involved in this study. The reason is that due to poor financial infrastructure and financial capital is not much significant in the study area and in case of social capital, an internal uniformity was observed, which was common for all Villages and bringing no significant variation. However, lack of access to these major resources directly or indirectly negatively affects rural household food security situation.

#### 4.2.4. Market Distance

Proximity to market centre creates access to additional income by providing off-farm/nonfarm employment opportunities and easy access to inputs and transportation. It was, therefore, expected that households nearer to market centre have better chance to improve household food security status than who do not have proximity to market centres. Table 10 depicts the statistical results of the two groups in relation to the effect of market distance on food security. The result was statistically significant at less than 10 % probability level. However, the mean distance of food secure group is greater than the food insecure ones. This result is contrary to the hypothesis stated for this study. The occurrence of this result may be due to the fact that when farmers are nearer to the market they would be tempted to sell their products and buy non-food items. But if they were away from market centres they would be food secure by consuming their own product.

Table : Distribution of households by market distance in km

Market Distance in km	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
0.18 – 11	19	19.6	18	25.4	37	22
12 – 15	62	63.9	40	56.3	102	60.7
16 – 20	16	16.5	13	18.3	29	17.3
	97	100	71	100	168	100
Mean	1.93		1.97		1.95	
SD	0.662		0.061		0.048	

Source: Field Survey, 2020

Livestock production is one of the main economic activities in the study area. A vast majority of the farmers surveyed rear various kinds of animals in order to produce animal products as well as to generate income both contributing to access of the households to food. The kinds of animals reared in the Gura Damole Woreda include cattle, sheep, goats, donkeys, camels, and Calves. Small ruminants and chicken are reared for meat and egg production respectively both for home consumption. Moreover, they are the first to be sold during a serious food shortage season. The average numbers of livestock holding between the two groups of sample farmers differ. In order to make comparison of the animal size between the farmer groups, the herd size was converted into livestock units (TLU) based on Storck *et al.* (2016). Food secure group own relatively larger number of oxen (14 and 5 for both groups respectively) than the food insecure, even though, the latter have relatively more cows. The food secure group has also large average size of total livestock holding when the total Number of livestock holding is considered (Table 11).

Table : Average Number of livestock holding by Sample households

Animals Type	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Caw (1)	18	18.6	14	19.7	32	19
Goats (2)	27	14.4	11	15.5	25	14.9
Sheep's (3)	32	33	21	29.6	53	31.5
Calves (4)	15	15.5	11	15.5	26	15.5
Oxen (5)	5	18.6	14	19.7	32	19
Camel (6)	0	0	0	0	0	0
Donkey (7)	0	0	0	0	0	0
	97	100	71	100	168	100
Mean	3.01		3		3.01	
SD	1.342		1.384		1.356	

Source: Field Survey, 2020

### 4.3. Biophysical Characteristics

#### 4.3.1. Fertility Level of Farmlands

Land Productivity: is essential to raise agricultural production on a given plot of land. Having large or small land is not the determinant, rather the fertility level of a soil to enhance crop productions. Different reasons were given concerning the declining trend in production. The responses of sample farmers on major reasons for the declining trend of crop production are shown in Table 12. Infertility of land was ranked as poor of farming. Out of total respondents who cited the various problems, about 47.6% of them mentioned poor fertility level of farmlands. The proportion of farmers who reported to have poor fertility level of farmlands is almost similar for both groups. About 49.3% of food secures and 46.4% of food insecure farmers reported to have soil fertility problem in their farm (Table 12).

Table : Fertility level of farmlands in the study area.

Fertility level of farmlands in the study area	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Poor (1)	45	46.4	35	49.3	80	47.6
Moderate (2)	38	39.2	28	39.4	66	39.3
Good (3)	14	14.4	8	11.3	22	13.1
Very good (4)	0	0.0	0	0.0	0	0.0
	97	100	71	100	168	100
Mean	1.68		1.62		1.65	
SD	0.715		0.684		0.701	

Source: Field Survey, 2020

#### 4.3.2. Rainfall

Rainfall is one of the most important natural element which, positively or negatively affect food security status of the household; because it determines the soil moisture, contents of surface and ground water; intensity of erosion; soil nutrient movement and uptake; and level of disease outbreak (Ekin, 2000). It is one of the major natural factors that affect agricultural activities. Erratic rain fall is common in most lowlands of our country. Two rainy season are known in the study area: one is from (September to November) and the other from (March to May), not more than one or two weeks rains in the two seasons farmers can crop their land like maize and sorghum but not harvested in the study area. As table 9 depicted that the amount of rainfall of the study area is in sufficient (89.88%). It is difficult to cultivate crop production by keeping rainfall. Particularly in the study area, were responded as insufficient rainfall (63.1%) followed by sufficient 36.9% (Table, 13).

Table : Amount of rainfall in the study area

Amount of rainfall in the study area	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Normal (1)	0	0	0	0	0	0
Sufficient (2)	34	35.1	28	39.4	62	36.9
Insufficient (3)	63	64.9	43	60.6	106	63.1
	97	100	71	100	168	100
Mean	2.65		2.61		2.63	
SD	0.48		0.492		0.484	

Source: Field Survey, 2020

### 4.3.3. Source of Water

Water is also one of the natural elements which are basic to all organisms. It serves as a food directly and uses for washing, cleaning, cooking, drinking and growing crops. Access to sufficient amount of water for human being is considered as one of the determinant factor for household food security situation. The presence of sufficient amount of water helps for livestock consumption and crop productions and can contribute to reduce vulnerability to drought (Hussein, 2006). As table 14 showed that, the main source of water was Rainwater harvesting followed by piped water or (37.5%) and 33.3%) respectively (Table 14).

Table : Source of water in the study area

Source of water in the study area	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
River (1)	6	6.2	5	7	11	6.5
Protected spring (2)	0	0	0	0	0	0
Un protected spring (3)	24	24.7	0	0	0	0
Piped water (4)	0	0	26	36.6	56	33.3
Pond (5)	30	30.9	14	19.7	38	22.6
Rainwater harvesting (6)	37	38.1	26	36.6	63	37.5
	97	100	71	100	168	100
Mean	2.95		2.86		2.91	
SD	0.972		1.004		0.984	

Source: Field Survey, 2020

### 4.3.4. Major Constraints of Crop Production

Different reasons were given concerning the declining trend in production. The responses of sample farmers on major reasons for the declining trend of crop production are shown in Table 15. There are many natural and human factors that affect crop production in the study area. As table 15 depicted, some of the major constraints in crop production in the study area are, drought (10.7%), erratic rain fall (41.1%), and lack of farm oxen (29.8%) and pests & disease (6% were the major challenges' in crop production in both selected Villages (Table 15).

Table : Major constraints of crop production in the study area

Major constraints	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Drought (1)	12	12.4	6	8.5	18	10.7
Pest and disease (2)	5	5.2	5	7	10	6
Erratic rain fall (3)	39	40.2	30	42.3	69	41.1
Lack of farm oxen (4)	28	28.9	22	31	50	29.8
In sufficient land holding (5)	9	9.3	6	8.5	15	8.9
Poor soil fertility (6)	4	4.1	2	2.8	6	3.6
Lack of modern input (7)	0	0.0	0	0.0	0	0.0
Insufficient cash (8)	0	0.0	0	0.0	0	0.0
	97	100	71	100	168	100
Mean	3.3		3.32		3.31	
SD	1.226		1.106		1.173	

Source: Field Survey, 2020

#### 4.4. Food security situation in the study area

The reason behind as table 16 indicated, in the study area bad weather condition (38.1%), failure to properly utilize own production (10.1%), lack of fair market (22.6%), environmental degradation (16.6%), Labor shortage (6.5%) and conflict (3%) are the major factors for food insecurity. Further, lack of work habit, limited know how to wards work, poor saving habit, believing food aid, lack of basic infrastructure etc. were the major constraints to be food in secured in the study area. However, there are common problems in both Villages, Such as: problem of transportation, lack of fair market, bad weather condition, limited know how in using farm oxen, lack of fair polices towards how to produce, for whom to produce and for whom to distribute their production were the common challenges to ensured food security in the study area (Table, 16).

Table : Cause of food in security in the study area

Cause of food in security	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Failure to properly utilized own production (1)	11	11.3	6	8.5	17	10.1
Bad weather condition (2)	36	37.1	28	39.4	64	38.1
Lack of fair market (3)	23	23.7	15	21.1	38	22.6
Labor shortage (4)	6	6.2	5	7	11	6.5
Environmental degradation (5)	18	18.6	15	21.1	33	16.6
Conflict (6)	3	3.1	2	2.8	5	3
	97	100	71	100	168	100
Mean	3.18		3.24		3.2	
SD	1.233		1.201		1.216	

Source: Field Survey, 2020

The present study showed that, the current main food in the rural households of the study area was maize, sorghum and wheat or 56%, 41% and 53% respectively (Table 17). Furthermore, as Woreda livestock department explained, livestock's are the main source of food such as, meat, milk next to agricultural production in the study area (Table 17).

Table : Main food in the study area

Main food in the study area	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Maize (1)	32	33	24	33.8	56	33.3
Sorghum (2)	22	22.7	19	26.8	41	24.4
Wheat (3)	31	32	22	31	53	31.5
Teff (4)	12	12.4	6	8.5	18	10.7
	97	100	71	100	168	100
Mean	2.24		2.14		2.2	
SD	1.049		0.99		1.022	

Source: Field Survey, 2020

The result of this study showed that, the main source of food in the study area was food aid, own production and depend on safety net (Table 18). More specifically, the main source of food in the study area have depend on food aid (61.9%), own production (34.5%) and are depend on safety net (3.6%) (Table 18).

Table : Main source of food in the study area

Main source of food in the study area	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Own production (1)	35	36.1	23	32.4	58	34.5
Depend on safety net (2)	4	4.1	2	2.8	6	3.6
Food aid (3)	59	59.8	46	64.8	104	61.9
	97	100	71	100	168	100
Mean	1.76		1.68		1.73	
SD	0.955		0.938		0.946	

Source: Field Survey, 2020

Coping strategies are mechanisms that households employ to keep all or some of their members alive under severe food stress. According to the United Nations (2016) report, which indicated that during food crisis, affected population adopt a variety of coping mechanisms to survive such strategies may include finding additional food or income or even, migration etc. It implies a forward planning approach mainly at a household and individual level and livelihood strategies consist of activities that generate the means of household survival (Ellis, 2019). Similarly, in this study indicated that, most of the rural households use different coping mechanisms during food shortage such as, food aid (53.57%) selling their livestock (27.38%), followed by, charcoal sale (11.90%) (Table 19). More specifically, in Yedi Village have used during food shortage was Food aid (52.58%), selling their livestock (27.83%) charcoal selling (12.37%) and out migration (7.22%). Whereas, the Hokoltu Village have used during food shortage food aid (54.93%), selling of livestock (26.76%), Charcoal sale (11.27%) followed by out migration (7.14%) (Table 19).

Table : Copping strategies in the study area

Copping strategies in the study area	Food insecure (97)		Food secure (71)		Total (168)	
	Freq.	%	Freq.	%	Freq.	%
Selling livestock (1)	36	37.1	25	35.2	61	36.3
Diet change (2)	0	0.0	0	0.0	0	0.0
Charcoal sale (3)	49	50.5	36	50.7	85	50.6
Food aid (4)	0	0.0	0	0.0	0	0.0
Out migration (5)	12	12.4	10	14.1	22	13.1
	97	100	71	100	168	100
Mean	2.51		2.58		2.54	
SD	1.324		1.349		1.331	

Source: Field Survey, 2020



#### 4.5. Econometric Results and Discussion on Determinants of Food Security

To identify determinants of food security, binary logit and ordered logit models were used. Normally this occurrence is not surprising because total annual income is a summation of total farm income and off-farm/non-farm income. Thus, due to this econometric problem total annual income was excluded from econometric model analysis. The maximum likelihood estimates and marginal effects of binary logit model are presented in Table 20.

Table : The ML estimates and ME of the Binary Logit Model

Variables	Coefficients	Odds ratio	Sig	ME
CONSTANT	-0.6695		0.791	
FAMESIZE	-2.1325***	0.1185	0	-0.4079
AGE	0.0487*	1.0499	0.071	0.0093
SEX	-1.5738	0.2073	0.276	-0.301
EDULEVEL	0.1023	1.1077	0.441	0.0196
LANDCULT	0.1617	1.1755	0.829	0.0309
TLU	0.0645	1.0666	0.794	0.0123
DISMARKT	0.1131*	1.1197	0.072	0.0216
Soil fertility problem (SOILPROB)	-1.3161	0.2683	0.165	-0.2517
Log likelihood function		-40.011		
Restricted log likelihood		-91.246		
Likelihood ratio index (LRI)		0.56		
Chi-squared		102.4692***		
Prediction success		93.57		

\*\*\* And \* are significant at less than 1% and 10% probability level respectively. ML= Maximum Likelihood and ME=Marginal Effect. Source: model output

The model result is significant at less than 1 % probability level indicating that the hypothesis that the coefficient except the intercept are equal to zero is rejected. Another measure of goodness of fit used in logistic regression analysis is prediction success, which indicates the number of sample observations correctly predicted by the model. The prediction success is based on the principle that if the estimated probability of the event is less than 0.5, the event will not occur and if it is greater than 0.5 the event will occur (Maddala, 2019). The applied model correctly predicted at 93.57 % of the sample households. Thus, the model fits the data. Put differently, the explanatory variables included in the model can explain the response variable significantly better than the model with the intercept only (Liao, 2014). Therefore; it is possible to interpret the model results meaningfully.

The binary logit model identified three significant variables out of eight hypothesized variables. These variables include family size (FAMSIZE), age of household head (AGE), market distance (DISMARKT). The interpretation and discussion of these significant variables are presented as follow.

Family size (FAMESIZE): this variable was significant at 1% probability level and negatively related with the state of food security. Negative relationship indicates that the odds ratio in favour of the probability of being food secure decreases with an increase in the family size measured in adult equivalent. The odds ratio of 0.1185 implies that, other things being constant, the odds ratio in favour of being food secure decreases by a factor of 0.1185 as family size increase by one adult equivalent. The result indicated that larger household size tends to be food insecure compared to smaller family size. The possible explanation is that those households who depend on limited productive resources will face food insecurity by increasing family size. Moreover, land size scarcity and degradation of cultivable land are common problems of the study area. This result is in conformity with the findings of Mulugeta Tefera (20016); Abebaw Shimeles (2013) and Ayalew Yimer (2013). The marginal effect of family size  $-0.4079$  indicates that the probability of being food secure will decrease by approximately 40.79 % with one additional family member in adult equivalent.

Age of household head (AGE): the direction of the coefficient of this variable showed a positive relation with food security and is significant at 10 % probability level. This means that an increase in the age of household head increases the likelihood for the household to become food secure. This is possible because farmers get more and more experience in their farming operation, climatic knowledge of their area, accumulate wealth and use better planning than the younger ones. Hence, they have better chance not to become food insecure. This result agrees with the prior expectation and the findings of Abebaw Shimeles (2017) and Ayalew Yimer (2013). The odds ratio, keeping other factor unchanged, in favour of food security increases by a factor of 1.0499 when age of the household head increases by one year. One year increase in the age of the household head will result in an increase the probability of being food secure by about 1 %.

Market distance (DISMARKT): market distance has been found to be positively related with food security and significant at less than 10 % probability level. It was expected that households nearer to market centers had better chances to be food secure than those who are away from market centers. But the result was not in agreement with the hypothesis stated.

Mulugeta Tefera (2015) reported that market distance does not have significant effect on food security. The odds ratio, *ceteris paribus*, in favour of food security increases by 1.1197 times if market distance increases by one kilometre. This means they consume what they had produced and became food secure. The probability of being food secure will increase about 2.2 % with one unit increase in market distance.

Family size (FAMESIZE): the log estimate for the family size is about -1.2250, and the corresponding effect on the odds after exponentiation is 0.2937. Other things being equal, the odds of being classified as food secure or food insecure without hunger versus food insecure with hunger would be 0.2937 times lesser with one adult equivalent increase in the family size. Under the same circumstance the odds of being classified as food secure versus food insecure with hunger would be 0.2937 times lesser with one adult equivalent increase in the family size. With one adult equivalent increase in the family size, the probability of being classified as food secure and food insecure without hunger will decrease about 7.09 and 10.88 % respectively, and that of being classified as food insecure with hunger will increase about 17.97 %.

Cultivated land size (LANDCULT): this variable is found to be significant and supported by the findings of Mulugeta Tefera (2014); Abebaw Shimeles (2013) and Ayalew Yimer (2013). The log estimate for this variable is about 1.9545, and its odds ratio is 7.0604. Other things being equal, the odds of being classified as food secure versus food insecure with hunger would be 7.0604 times greater with one unit increase in cultivated land size. With one-hectare increase in the cultivated land size, the probability of being classified as food insecure without hunger will increase about 17.36 %, and that of being classified as food secure will increase about 11.32 %. The probability of being classified as food insecure with hunger will decrease about 28.67 %.

Soil fertility problem (SOILPROB): empirical findings indicate that soil fertility problem has a relation with the level of food security. However, Mulugeta Tefera (2017) and Ayalew Yimer (2013) have shown that soil fertility problem do not have significant effect on household food security status. On the contrary to their result, this study revealed that this variable affects household food security significantly. The logit estimate for soil fertility problem is approximately -1.2199 and its odds ratio is about 0.2953. Other things being equal, the odds for those households with soil fertility problem to have been classified as food secure instead of food insecure with hunger is about 0.2953 times as low as those households

without the problem. Existence of soil fertility problem will decrease the chance of being classified as food secure and food insecure without hunger by 7.06 and 10.83 % respectively, but increase a chance of being classified as food insecure with hunger by 17.90 %.

## 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### 5.1. Summary

Food security has been defined as “access by all people at all times to enough food for an active and healthy life.” Food insecurity is the most crucial problem facing rural households in Gura Damole Woreda. Even though the study area has considerable agricultural potential, more than half of its rural households are unable to feed themselves throughout the year. The objectives of this study were to measure the extent of food insecurity and its determinants in Gura Damole Woreda. Two stage random sampling technique was applied to get 168 sample respondents. To achieve these objectives, Descriptive statistics and binary logit were used. An attempt has also been made to look into the survival mechanisms of the households.

The problem of food in security is pervasive in Ethiopia in general and in Oromia region in particular. Similarly, in the study area, there is series food security problem specially, in rural households. With this in mind; the study has attempted to identify major factors that affect food security in rural households in the study area by assessing agro ecological variations, natural factors, accesses to productive assets, demographic characteristics and human capital. Another factor is natural factor (access to land and water sources) of accessing the land in the study area; mostly the land have not accessed (76.79%) and only accessed the land 23.21% informally; through inherited from their parents, share with relatives and by rent, rather than formally distributed in the study area. Besides they are accessed to high potential water source (Haro Dumal river) which crosses the study area and very comfortable for irrigation farming. Related to productive assets (such as, level of using agricultural inputs, livestock ownership), the rural households in the study area have not used different agricultural inputs (78.26%) such as, improved seeds, chemical fertilizer and herbicides. Another major factor was demographic characteristics of households and level of human capital (level of education and health status). In case of family size, there is large family size in most rural households in the study area. Further, health status in the study area is extremely poor that many households are suffered by different diseases such as, water born disease, malaria, HIV, tuberculosis (TV), cancer, diabetes mellitus etc. though they have accessed the health services but very poor health facilities, lack of qualified workers, lack of medicine, limited knowhow in using the health service rather than praying and reading kuran etc were the major problems related to the health status of households in the study area Another important factor that causes food

in security in the study area were very limited non-farm income specially, the only source of income are livestock and in certain extent trade. Finally, the researcher was assessed the major constraints of crop production and major hazards in the study area. Some of the common constraints in crop production were drought, erratic rain fall and limited knowhow in using farm oxen rather than using labour force and sticks. Furthermore, in accessibility of agricultural inputs, insufficient land holding, pests and disease etc. are the major constraints in crop production. And drought, flood, malaria and land degradation were some of the major hazards in the study area that affects food security.

## 5.2. Conclusion

The factors and elements that affect food security are complex and multifaceted in nature and not easy to comprehend. Therefore, effort has been made in this study to see direct and indirect influences of the bio-physical, natural and human factors and level of households' access to livelihood assets on household food security situation in rural households. Bio-physical risks like climatic shocks (erratic and variable rainfall, and recurrent drought, flood), soil and land degradation, crop and animal diseases were the first biophysical constraint to produce something in the study area. Absence of basic infrastructure was among the formidable constraints perceived as most detrimental to household food security towards their production. The study revealed that, the status of household food security is determined mainly by access to productive resources/asset that is required to produce and generate income. Households that have no adequate amount of these resources might not have the means and ability to produce enough food/or to generate adequate income. Thus, households who do not have the capacity to command adequate amount of productive resources and/or who have no options to generate income are severely food insecure. It has been pointed out in the discussions that, weak attitude towards work, limited know how, believing food aid, agro-ecological factors that included drought and erratic rains, weak socio-cultural attitude and absence of basic infrastructural network and lack of peace that stayed for long period of time, are identified as the underlying causes of food insecurity in rural households. According to the study, believing food aid is one of the major obstacles in the study area not to work. And have a great impact on the local market price and fail the agricultural price and discouraging rural households not to produce more. It is also, pointed out in the study, households have practiced traditional method of cultivation. Regarding to family size, large family size is the most common in the study area and have a great impact on household food security. Regarding coping strategies, the main coping mechanisms during food shortage were decreasing number of livestock, food aid, skipping meals, selling fire wood and wood products such as, chair, bed, table, charcoal production. Finally, with reference to food insecure households we conclude that providing basic infrastructure, distributing of land formally to all rural households, increase in oxen ownership and using in farming, decrease in household size, decrease in distance to input sources, increase in agricultural inputs, increase in educational level of household head, increase in livestock ownership, expanding veterinary services, expanding agricultural and non-agricultural activities and stopping or interrupting food aid can encourage towards work.

In general, Bio-physical related problems such as erratic rainfall distribution, recurrent drought, deforestation, and pest and disease infestation are the main constraints to crop production, and thereby leading household to decline in food availability and increase household vulnerability to food insecurity. Regarding household food utilization, poor water supply and sanitation, poor food rationing and saving habit exacerbate household food insecurity.



### 5.3. Recommendations

Based on the findings of this study the following issues were recommendations to improve rural household food security in the study area.

- ✚ Providing basic infrastructure and social network such as, transport, fair market, health education etc to encourage households towards their economic activities.
- ✚ Gura Damole Woreda is facing food insecurity; there is a need for strategies which should aim at improving food security status.
- ✚ Collecting data in a given interval will ensure the accuracy of household food security prevalence data and helps to screen “at risk” households. Knowing this will capture what policymakers and food assistance program managers need to know to improve household food security. Can do this monitoring, as it is a simple food security measurement tool.
- ✚ Family size and food security are strongly and negatively related. Therefore, proper attention has to be given to limit the increasing population in the study area. This can be achieved by integrated health and education services.
- ✚ Age has positive impact on food security. This means younger households are less likely to be food secure. Therefore, capacity building for young household heads should be given.
- ✚ Cultivated land size was found to be significant. Physical and biological conservation measures should be widely promoted to enable the households to maintain their food security status rather than expanding the land size. The cultivable land in the study area is so limited and no opportunity to expand. This also implies that research and extension have to look for the better conservation practices so as to improve the farmers’ food access sustainably.
- ✚ One area of intervention hypothesized to improve the state of food security at household level is promoting the total farm income via the production of different crops and livestock. This implies that efforts have to be made to improve food security through better livestock management, promoting & developing irrigation programs and other agricultural activities.
- ✚ Soil fertility problem was found to be significant and negatively related with food security. To reduce food insecurity physical and biological conservation measures for the degraded farmland, the use of inorganic and organic fertilizers should be widely promoted. To address this formal and non-formal education has to be improved.

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## **7. APPENDICES**

### **Appendix A HARAMAYA UNIVERSITY**

#### **SCHOOL OF GRADUATE STUDIES**


#### **COLLEGE OF SOCIAL SCIENCE AND HUMANITIES**

#### **SCHOOL OF GEOGRAPHY AND ENVIRONMENTAL STUDIES**

### **STRUCTURED AND SEMI STRUCTURED QUESTIONNAIRE FOR HOUSEHOLD SURVEY**

The main purpose of this questionnaire was to collect first-hand information during the study on **Factors Affecting Rural Household Food Security Situation in Gura Damole Woreda**. The study was effective or success depending on your reliable responses and your response was used only for the intended study. So, please indicate your response by encircling the different items and fill the provided space for the structured questionnaire.

#### **General Direction:**

 Please answer all questions properly and clearly

Be free to answer all questions (this is simply to indicate a solution for the problem of food security)

I appreciate all your cooperation's

Thank you!!!

## A. Structured Questionnaire

### I. General information

3. Name of household head: \_\_\_\_\_

4. Date of Interview: \_\_\_\_\_

### II. Household Demographic Characteristics

1. Sex of household head: a) Male b) Female

2. Age of respondents: \_\_\_\_\_

a. <25 b. 25-35 c. 35-45 d. 45-55 e. 55-65 f. 65& above

3. Marital status:

a. Single b. Married c. Divorced d. widow

4. Educational Level

a. Illiterate \_\_\_\_\_

b. Can read and write (Informal education) \_\_\_\_\_

c. Formal education grade level (1-8)

d. above grade 8

5. Ethnicity:

a. Oromo b. Amharic c. Somali d. Other specify

6. Religion:

a. Muslim \_\_\_\_\_ b. Orthodox \_\_\_\_\_ c. Protestant \_\_\_\_\_ d. Catholic  
\_\_\_\_\_ e. Other specify

7. How many household members residing in your family?

a. 1-2 b) 3-5 c) 6-8 d) 9-11 e) 12-14 f) >14



### III. Access to natural capital

1. Do you have your own land?

a. Yes \_\_\_\_ b) No \_\_\_\_\_

2. If your response is 'yes' for Q No 1, how did you access to it?

a) Through land redistribution

b) Share with relatives

c) Inherited with parents

d) Purchased

e) Others specify

3. What happened to the size of your land holding by you over the last two years?

A) Increasing b) Decreasing c) No change

4. If your response is 'decreasing' for Q No 3, what was/were the reason/s \_\_\_\_\_?

a) Large household size

b) Decline in the quality of land

c) Redistribution of land to their tribes

d) Others (specify) \_\_\_\_\_

5. What is the fertility status of your farm land?

a) Poor b) Moderate c) good d) Very good

6. What constrained you not to expand your crop production that can feed your household?

Indicate the degree of influence?

Major constraints	Yes or No	Indicate the degree of influence
Drought		
Pest and disease		
Erratic rain fall		
Lack of farm oxen		
Insufficient land holding		
Poor soil fertility		
Lack of appropriate technology		
Insufficient cash		

7. Do you use modern inputs, to get better yields?

a) .yes b) no

8. How do you evaluate the condition of rainfall in your area for crop production and livestock rearing?

a) Normal b) Sufficient c) Insufficient

9. What are your current main sources of water for household consumption?

a) River

b) Protected spring

c) Unprotected spring

d) Piped water

e) Pond

f) Rain water harvest

g) Other, specify \_\_\_\_\_

10. How long does it take to collect the water? Hour \_\_\_\_\_ Minutes \_\_\_\_\_?

11. What are the most important hazards recurring in your area? Put the below options in highest to lowest order (drought, flood, malaria, pests and disease, conflict, animal disease, increasing food price, water shortage other specify).

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## VI. Crop Production and livestock rising

1. What is the main livelihood of this household?

- a) Agriculture
- b) Agro-pastoralist
- c) Pastoralist
- d) Others, specify\_\_\_\_\_

2. If your response is Agro-pastoralist for Q No 1, what kind of crops do you produce?

Put the four staple crops in order of importance\_\_\_\_\_

- a. Sorghum
- b. Maize
- c. Teff
- d. Barley
- e. Wheat
- f. Others specify\_\_\_\_\_

3. Do you have own livestock?

- a) Yes b) No

4. If your response to Q No 3 is yes, please give us the following data

SNO	Type of livestock	Yes or No	Range/size
1	Oxen		
2	Cows		
3	Sheep's		
4	Goats		

5	Camel		
6	Donkey		

5. How do you see the trend of livestock ownership in your household for last 2 years?

- a) Increasing
- b) Decreasing
- c) No change

6. For what purpose you use mainly livestock and their products?

- a) For cash income
- b) For food
- c) Both for food and cash equally

7. Would you mention the major problems of livestock rising (allowing multiple responses)?

- a) Shortage of grazing
- b) Animal diseases
- c) Lack of breeding
- d) Water shortage
- e) Other if any \_\_\_\_\_

#### **IV. Access to infrastructure**

1. What is your distance from market center? \_\_\_\_\_ On foot: Hour \_\_\_\_\_ Minutes \_\_\_\_\_

2. Distance from main road\_\_\_\_\_. On foot Hour \_\_\_\_\_ Minutes \_\_\_\_\_

3. How do you transport your produce to the nearby market?

- a) On donkey back
- b) On camel back
- c) Carry it yourself

d) By using public transportation

e) Others specify \_\_\_\_\_

4. Is your household access to health services?

a) Yes b) No

5. Distance from the health service: Hour \_\_\_\_\_ Minutes \_\_\_\_\_

6. Is your household access to school?

a) Yes b) No

7. Which school are you sending your child (children)?

a) In formal school

b) Formal schools

c) Religious school

d) I do not send to school

**Questions Related With Food Security Situation in the Study Area.**

1. How do you evaluate your household food security?

a) Food secure

b) Food insecure

2. If your answer is 'b' what are the major causes for food insecurity in your household?

a) Low and variable rainfall

b) Limited non-agricultural

c) Population pressure

d) Environmental degradation

e) Conflict

g) Lack of fair market

h) Others specify

**B. Semi- structured questionnaire**

1. What are the major problems that you faced in crop cultivation?

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2. What are your major constraints to non-agricultural employment activities?

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3. What are the causes of food insecurity in your area?

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4. What are your major assets in your house hold?

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5. What are the basic infrastructures in your area?

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**Appendix B**  
**HARAMAYA UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**COLLEGE OF SOCIAL SCIENCE AND HUMANITIES**  
**SCHOOL OF GEOGRAPHY AND ENVIRONMENTAL STUDIES**  
**FILED OBSERVATION IN THE STUDY AREA**

**Field Observation**

**I. Environment**

1. Area
2. Relief (plain, plateau, mountain, cliff and steep slopes)
3. Agro-climate
4. Land-use and land cover
5. Water bodies

**II. Population**

1. Population size
2. Settlement patterns
3. Ethnicity
4. Religion
5. Culture, value, traditions
6. Mobility and migration

**III. Economy/sources of livelihood**

1. Main source of livelihood: mixed farming, non-farm activities, pasture
2. Crop types: dominant in terms of area cultivated and size of harvest

3. Livestock: type, size, raising practices.
4. Social and economic infrastructure: transport, water, health, marketing, extension services.



