

# **DETERMINANTS OF FOOD INSECURITY IN HABRU WORDA RURAL HOUSEHOLDS**

A Thesis Submitted to the Department of Economics of the Faculty of Business  
and Economics of Woldia University for the Partial Fulfilment of the  
Requirements for the Award of the Degree of

**MASTER OF SCIENCE (MSC)  
IN  
DEVELOPMENT ECONOMICS**

By

**TEMESGEN BAHIRU  
ID GSE14012**



Department of Economics  
Faculty of Business and Economics  
Woldia University

June, 2024 G.C  
Woldia, Ethiopia

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**ADVISOR: ABEBE DERBIE (Ph.D.)**



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**APPROVAL PAGE**  
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Has been examined by the undersigned panel of examiners and has received full approval for acceptance in partial fulfilment for the degree of

MSc in Development Economics

Supervisor: \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Co Supervisor: \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Examiner (external): \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

Examiner (internal): \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

## **Declaration**

I, Temesgen Bahiru ID gse14012 Session, Determinants of Food Insecurity in Habru Worda Rural Households, hereby certify that the work embodied in this MSc thesis is my own bonafide work carried out by me under the supervision of Abebe Derbie (Ph.D) from 2022 to2024 at Department of Economics Woldia University, Woldia, Ethiopia. The matter embodied in this MSc. thesis has not been published in this form or another nor has it been submitted for evaluation to another examination authority for the award of any other degree/diploma. I declare that I have faithfully acknowledged, given credit to and referred to the research workers wherever their works have been cited in the text and the body of the thesis. I further certify that I have not willfully lifted up some other's work, para, text, data, results, etc. reported in the journals, books, magazines, reports, dissertations, theses, etc., or available at web-sites and included them in this MSc thesis and cited as my own work. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the University. The Similarity Index is below permissibly limit.

Student's Name: Temesgen Bahiru

Signature \_\_\_\_\_

Date \_\_\_\_\_

Confirmed by

Supervisor: Abebe Derbie (Ph.D) Signature \_\_\_\_\_ Date \_\_\_\_\_

(Name & Designation)

Co-supervisor: \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

(Name & Designation)

### **Certification**

This is to certify that this thesis entitled "Determinants of Food Insecurity in Habru Worda Rural Households " embodies the work carried out by Temesgen Bahiru himself under my supervision and that is worthy of consideration for the award of the MSc degree.

Advisor: Abebe Derbie (Ph.D) Signature \_\_\_\_\_ Date \_\_\_\_\_

Co-supervisor: \_\_\_\_\_ Signature \_\_\_\_\_ Date \_\_\_\_\_

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## **Abstract**

Food insecurity and poverty are persistent issues facing the majority of Ethiopians. This study aims to assess the determinants of household food insecurity in Habru Woreda Rural Households. The research utilized a multi-stage random sampling method. Descriptive statistics such as mean, standard deviation, frequency, chi-square test, and t-test were employed to compare food-insecure and food-secure households.

A binary logit model was used to identify the determinants of food insecurity. The results revealed that 60.89% of households were food insecure, while 39.11% were food secure. Twelve variables were found to be statistically significant, including family size, level of education, cultivated land size, irrigated land size, technology adoption, dependency ratio, access to credit, credit interest acceptance, total livestock owned, total off-farm income, stimulant expenses, and the number of oxen owned by the household. The study also identified various household food insecurity coping strategies. These included reducing the number/quality of meals eaten (19.39%) and relying on less expensive foods (18.53%) to bridge the food gap. Recommendations from the study include providing informal education and training on agricultural production, implementing small-scale farming systems like irrigation schemes, beekeeping, and animal rearing, subsidizing input costs to make them more affordable, and minimizing stimulant expenses through farmer training and promoting agricultural technologies. To address food insecurity in the district, the researcher suggests implementing community gardens, promoting local agriculture initiatives, providing education on nutrition and cooking skills, and collaborating with local organizations to distribute food resources effectively.

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## **Acronyms /Abbreviations**

FAO	Food for Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
FEDO	Finance and Economics Development Office
FEWS NET	Family Early Warning System Network
GDP	Gross Domestic Product
HFS	Household Food Security
IPC	Integrated food security Phase Classification
MLE	Maximum Marginal Effect
MOARD	Minister of Agriculture and Rural Development
NGO	Non-Governmental Organization
OFSPs	Other Food Security Programs
PAs	Peasant Association
PCA	Principal Component Analysis
PSNP	Productive Safety Net Program
RRC	Relief and Rehabilitation Commission
TLU	Tropical Livestock Unit
UNDP	United Nation Development Program
USAID	United States Aid for International Development
VIF	Variance Inflation Factor
WFP	World Food Program
ADLI	Agriculture Development Led Industrialization
AE	Adult Equivalent
AME	Average Maximum Effect
ARDO	Agriculture and Rural Development Office
CIDA	Canadian International Development Agency
DIFD	Department for International Development
ENI	Ethiopia Nutrition Institute
ARBOA	Amhara Regional Bearu of Agriculture

# CHAPTER ONE

## 1. INTRODUCTION

### 1.1. Background of the Study

Food insecurity is the opposite of food security and refers to the lack of consistent access to enough food for an active, healthy life. It can manifest in various ways, such as inadequate quality or quantity of food, limited access to food due to financial constraints, or uncertainty about where the next meal will come from. Food insecurity can lead to malnutrition, hunger, and negative health outcomes, impacting individuals' overall well-being and quality of life.

Measurements of food security can vary depending on the context and the specific indicators being used. Some common measurements of food security include:

**Food Availability:** This measures the physical availability of food within a given area, including production levels, imports, and food stocks.

**Food Access:** This refers to the ability of individuals and households to acquire food, which can be influenced by factors such as income, prices, and access to markets.

**Food Utilization:** This assesses how well individuals utilize the food they have access to, including dietary diversity, nutritional quality, and food safety.

**Stability:** This measures the ability of individuals and communities to access food consistently over time, without facing sudden disruptions or shocks.

These measurements are often used in combination to provide a comprehensive understanding of food security at the individual, household, community, and national levels (I Manikas · 2023)

The 2020 State of Food and Nutrition Security in the World (SOFI) estimates that close to 690 million people, or about 9 percent of the world population, did not have access to enough food or undernourished in 2019. These statistics, however, assume that having enough calories is the only thing that human beings need to live a healthy and active life. This is not the case. To improve the accuracy of the information presented for the first time, the SOFI report also includes new measures of food security, which show that up to 2 billion people did not have access to safe, nutritious, and sufficient food in 2019 and 3 billion could not afford a healthy diet. The prevalence of food insecurity is significantly higher in Africa compared to other parts of the world (FAO, 2017; Smith et al., 2017; Drammeh et al., 2019). According to FAO et al. (2019), more than 50% of the African population experienced moderate or severe food insecurity in 2018, with the highest levels recorded in East Africa at 63%. This indicates that a significant

portion of the East African population lacks regular access to nutritious and sufficient food for a healthy and productive life."

Ethiopia is situated in one of the most food-insecure regions globally, with an estimated population of approximately 123,379,924 million (Ethiopian Statistics Agency, 2022). It is the second most populous country in Africa, following Nigeria. Fueled by a high fertility rate, Ethiopia is undergoing a significant annual population growth rate of around 2.53 percent (UN, 2021). The nation is currently facing one of the highest population growth rates, resulting in a net addition of 2 million newborn children each year.

The Ethiopian economy is primarily agricultural and is expected to remain so in the foreseeable future. Agriculture accounts for over 75% of employment, contributes to 40% of the GDP, and represents over 80% of exports (USAID, 2021). Consequently, the performance of the agricultural sector is likely to have a significant impact on economic growth and the living standards of the Ethiopian population.

Ethiopia is predominantly a rural and youthful society, with 84 percent residing primarily in densely populated highlands. It is also considered one of the poorest countries globally, with 24% of the population below the poverty line in 2020, according to World Bank data. The Ethiopian economy is primarily subsistence-based and heavily reliant on agriculture, with over 84 percent of the population engaged in agricultural activities for their livelihoods. Agriculture contributes to nearly half of the GDP and accounts for more than 90 percent of export earnings (MoF, 2021).

The factors contributing to food insecurity in Ethiopia are numerous and interconnected, varying from region to region. In rural areas of the country, key determinants of food insecurity include natural disasters like drought and climate change, population growth, fragmentation and degradation of cultivated land, limited access to credit, lack of off-farm income opportunities, inadequate technology adoption, insufficient infrastructure, absence of a stable political system, and armed conflicts.

The Amhara region is well-known for its productivity in Ethiopia, but out of the 167 districts, 87 districts (52.1%) are classified as chronically food insecure (ARBOA 2022). The North Wollo zone stands out as one of the most severely affected areas by food shortages and chronic food insecurity in the region, even during periods of normal rainfall. Crop failures occur approximately every three years due to the erratic distribution of rainfall during the growing seasons, often leading to recurrent droughts that impact numerous households. Specifically,

Habru woreda is identified as one of the food-insecure districts in the North Wollo zone. This district has been consistently classified as chronically food insecure for the past 15 years, making its population eligible to participate in the Government's food security program (ARBOFS 2022).

## **1.2. Statement of The Problem**

Food insecurity in Ethiopia is influenced by various factors, including limited access to agricultural resources, inadequate food distribution infrastructure, the impact of climate change on agricultural productivity, poverty, income inequality, lack of education on nutrition and food preparation, political instability, and conflict disrupting food supply chains. It is essential to identify and address these determinants to develop effective strategies to combat food insecurity in Ethiopia. The prevalence of food insecurity is significantly higher in Africa compared to other parts of the world (FAO, 2017; Smith et al., 2017; Drammeh et al., Kabubo-Marara and Mulwa, 2019). In 2018, more than 50% of the African population experienced moderate or severe food insecurity (FAO et al., 2019), with the highest levels recorded in East Africa, where 63% of the population (272 million people) faced food insecurity. This highlights the lack of regular access to nutritious and sufficient food for a healthy and productive life among a significant portion of the East African population.

Food insecurity and poverty remain significant challenges for the majority of Ethiopians. Despite being one of the world's least developed countries, Ethiopia is ranked 165 out of 185 countries in the 2021 IMF World Economic Outlook and 173 out of 189 in the 2019 Global Hunger Index. Approximately 27% of the population lives below the national poverty line of USD 1.90 a day, as reported in the World Bank's 2020 report. Agriculture plays a crucial role in Ethiopia's economy, contributing over one-third of the GDP and offering opportunities for about three-quarters of the population (Wolfrey et al., 2021). According to Woldeamlak (2009), drought occurs once every three or four years in Ethiopia. Environmental degradation is also a critical factor which exacerbates soil loss, deforestation, and pest incidence all of which contributes food insecurity. In addition, rapid Population growth, poverty, rural-urban migration, and conflict can contribute to food insecurity.

In 2019, approximately 2.2 million people in Ethiopia were internally displaced, according to the UN. Additional factors such as localized crop failures, high food prices, and the lingering effects of previous droughts have contributed to a high prevalence of acute food insecurity. The Ethiopia Humanitarian Response Plan estimated that around 23.8 million people were in need of

humanitarian assistance in the third quarter of 2021. Rapid population growth is a significant factor contributing to food insecurity in Ethiopia, with the current growth rate standing at about 2.61% (UN, 2019). Additionally, 37% of children under the age of 5 in Ethiopia suffer from malnutrition (Ethiopian Public Health Institute, 2019).

The Family Early Warning Systems Network (FEWS NET) reports that in 2021, assistance needs across much of Ethiopia are at their highest level since 2016, driven by various factors such as increased conflict since late 2020 leading to displacement and widespread reductions in household access to food and income, as well as reduced agricultural production, particularly in the belt-producing areas of the country. Ethiopia's deteriorating macroeconomic conditions have resulted in higher food prices and reduced purchasing power, further exacerbating the situation. The combination of these factors is leading to reduced access to food for many poor households. Between October and December 2020, an estimated 8.6 million people in Ethiopia were facing high levels of acute food insecurity according to the Integrated Food Insecurity Phase Classification (IPC), with 1.4 million people in emergency (IPC Phase 4). The COVID-19 pandemic has had unprecedented social and economic impacts globally, including in Ethiopia. The economic effects of COVID-19 in Ethiopia have led to increased prices of basic food items, rising unemployment, economic slowdown, and an increase in poverty (IPC, 2020). The Habru District exemplifies the development challenges currently faced by Ethiopia. This district is one of the 87 districts in the Amhara National Regional State categorized as structurally food insecure. Approximately 15-30% of the population in the study area requires food aid annually, with an estimated 22,800 people included in the government's Productive Safety Net Program (PSNP) (FDGE, 2023). The woreda has been repeatedly affected by drought and famine.

Examining the disaster history of the district reveals that residents have been consistently receiving various forms of food aid. The first recorded relief distribution in Habru took place in 1973. However, the per capita growth of major food production in the study area has not been adequate to meet the demands of a growing population. This is primarily due to the degradation of land resources, such as soils and vegetation, caused by factors like population pressure, over cultivation, deforestation, overgrazing, crop losses, and high input costs. Habru district exemplifies the development challenges faced by Ethiopia, being one of the most chronically food-insecure areas in the Amhara Regional State and among the 87 vulnerable woredas targeted by Regional Food Security programs. The district has experienced recurring droughts and famines. Reviewing the disaster history of the Woreda reveals that residents have been consistently receiving food aid in various forms, including other food security programs (OFSPs) and the

Productive Safety Net Program, since 2005.

According to the Habru Woreda Disaster Risk Profile report in 2022, drought, flood, conflict, and political instability are the major hazards affecting households' livelihoods in the district. Many farmers in Habru District under the age of 48 have limited or no land, putting them at risk of severe food insecurity because they were minors during the land distribution in 1991 and did not acquire land (FDRE Land Distribution 1991). Therefore, efforts are being made to study and analyze the socio-economic factors associated with household food insecurity in rural areas of Habru. The study aims to address gaps identified in previous research, specifically focusing on credit interest acceptance and stimulant expenses. The research will concentrate on determining the factors contributing to household food insecurity in rural areas, specifically in the case of Habru District.

Credit interest acceptance is the process through which an individual or entity agrees to a specific interest rate on a credit arrangement. This typically occurs when a borrower accepts the terms and conditions of a loan or credit agreement, including the specified interest rate that will be applied to the borrowed funds. By agreeing to the credit interest rate, the borrower acknowledges and accepts the borrowing costs and repayment terms associated with the credit arrangement.

On the other hand, stimulant expenses refer to costs related to goods or services intended to enhance alertness in individuals. These expenses may include items such as tea, coffee, cigarettes, and stimulant substances like ganja (a local stimulant). These expenses can contribute to food insecurity and may disrupt social and work habits.

Additionally, challenges such as inadequate food production growth, high population growth, inappropriate government intervention in the economy, and prolonged civil conflicts have made achieving food security a difficult task.

Food insecurity varies significantly among households within the same country. In Ethiopia, some households experience food insecurity even in areas where the typical drivers of food insecurity are not present. Despite numerous efforts to achieve food security at the household level in rural Ethiopia, it remains a challenging goal. The poor performance of household food security in Ethiopia is linked to inadequate institutional support and a heavy reliance on rain-fed agriculture, which is highly susceptible to drought, resulting in loss of lives and livelihoods for rural households every three years (Abduselam, 2017).

While many researchers have studied household food insecurity in Ethiopia, their findings and conclusions have varied. This research aims to examine the primary determinants of food insecurity, coping strategies, and policy options, particularly focusing on variables such as credit interest acceptance and stimulant expenses available to rural households in Habru Woreda.

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

#### **1.3.1. General Objective**

The study aims to examine the determinants of food insecurity among rural households in the Habru woreda.

#### **1.3.2. The Specific Objectives**

1. To investigate the socio-economic characteristics of food-secure rural households;
2. To analyze the primary determinants of food insecurity among rural households in the study area.
3. To examine the coping strategies employed by rural households to address food insecurity in the Habru District

### **1.4. Major Research Questions**

- How do different socio-economic variables affect household livelihood?
- What are the determinants of household food insecurity in rural areas of Habru district?
- What are the households' food insecurity copying mechanisms?

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

A comprehensive understanding of the primary determinants of food insecurity assists policymakers and planners in developing new policies to enhance food security. Additionally, this study offers essential information for decision-makers in the woreda regarding food security issues. Both domestic and international NGOs focused on advancing rural development in the study area can benefit from the study's findings. Furthermore, the study provides valuable insights for researchers and students interested in the topic, encouraging further investigations into similar issues in other areas.

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

The study was conducted in Habru Woreda, North Wollo Zone, and Amhara Regional State. It covered eight rural kebeles, and a sample of 381 rural households was drawn. The study aimed to identify the determinants of food insecurity at the household level using data from 2023 G.C.

Furthermore, the study focused on a limited number of households and their determinants of food insecurity. The scope of the study was constrained by time, budget, and other resource limitations. Additionally, challenges such as limited internet access and the current social unrest situation hindered the collection of required data.

### **1.7. Organization of the Study**

The study comprises five chapters. The first chapter covers the introductory part of the study, including the background, statement of the problem, objectives, significance, scope, and organization. Chapter two reviews theoretical and empirical literature on the determinants of food insecurity in rural households globally and in Ethiopia. The third chapter presents the methodology, including data analysis methods and model specifications. The fourth chapter focuses on analyzing and interpreting the data results. Finally, the last chapter contains the conclusion and recommendations.

## **CHAPTER TWO**

### **2. LITERATURE REVIEW**

#### **2.1.Theoretical Review**

##### **2.1.1. Definition of Food Insecurity**

Food insecurity is described as “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (American Dietetic Association 1998). Thomas (2006) defines food insecurity as “Food insecurity exists when people do not have adequate physical, social or economic access to the sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

The FAO definition of food insecurity is:

“A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life.”

Any analysis of food security will examine whether a change from security to insecurity or insecurity to security actually takes place and also the probability of such a change happening. Factors that may lead to a situation of food insecurity include non-availability of food, lack of access, improper utilization and instability over a certain time period. The 1996 World Food Summit declared the fight against food insecurity as one of its objectives:

##### **2.1.2. Types of Food Insecurity**

###### **2.1.2.1. Chronic Food Insecurity**

Chronic food insecurity occurs when people are unable to meet their minimum food requirements over a sustained period of time (DFID 2004).Chronic food insecurity is often explained in terms of structural deficiencies in the local economy or food system, and is explained in terms of poverty, lack of assets and/or inadequate access to resources. It follows that chronic food insecurity is usually the result of persistent structural vulnerability (FIVIMS 2002).

###### **2.1.2.2. Acute or Transitory Food Insecurity**

Transitory food insecurity refers to a sudden (and often precipitous) drop in the ability to purchase or grow enough food to meet physiological requirements for good health and activity (BarrettandSahn2001).Transitory food insecurity is primarily caused by short-term shocks and fluctuations in food availability and food access. The major sources of transitory food insecurity are year-to-year variations in international food prices, foreign exchange earnings, domestic food production and house hold incomes (World Bank 1986).

### **2.1.3. Definition and Concepts of Food Security**

The term and the concept of 'food security' were started nearly four and a half-decade ago during the World Food Conference organised in 1974 by Food and Agricultural Organization (FAO) of the United Nations. The world community for the first time in this conference tried to find out ways and means to provide food security to the hungry people by producing enough food, promise for the supply of food and giving safety form with the fluctuations in food prices (Anderson and Cook, 1999) and first time the concept of food insecurity came into existence as a means to distinguish the relationship between hunger, poverty and unemployment.

The issue of food security really came to the fore in the 1970s and at the 1974 World Food Conference in Rome the first explicit acknowledgement was made that this issue concerned the whole of mankind: (FAO 1974)

“Every man, woman and child has the inalienable right to be free from hunger and malnutrition in order to develop fully and maintain their physical and mental faculties.

Accordingly, the eradication of hunger is a common objective of all the countries of the international community, especially of the developed countries and others in a position to help.”(United Nation, 1975, Report of the World Food Conference, Rome 5-16 November 1974. NewYork).

Since the 1974 Rome conference the whole concept has “evolved, developed, multiplied and diversified” (Maxwell, 1996). There are now thought to be almost two hundred definitions of food security (Smith et al., 1993) which is a clear indication of differing views and approaches to the problem; however, the definition that has acquired the broadest acceptance is that of the World Food Summit (WFS) in November 1996:

“Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.”

Back in the 1970s the whole problem of food security was basically seen as one of supply, stemming from a series of food crises and major outbreaks of famine that the hoped-for promises of the Green revolution had done little to avert. The main focus was on guaranteeing the availability of food as well as attempting to ensure price stability both nationally and internationally through increased food production and the use of food surpluses. This approach led to the 1974 definition of food security:

“Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices” (United Nations.1975. Report of the World Food Conference, Rome 5-16 November 1974. New York).

The Green revolution of the 1980s began to deliver some of its promise and levels of food production did in fact increase; however, the problem of famine did not go away and it was at this point that it was realized that the underlying cause was not so much food supply as the purchasing power of specific social groups. The definition of food security now took in the economic as well as the physical aspects of food availability and attention was drawn to ways to alleviate poverty and enhance the role of women in the development process.

The definition was further widened when Amartya Sen’s book “Poverty and Famines” came out in 1981. His book made the point that the starving are often denied access to food rather than suffering because food is unavailable and in so doing introduced the idea of entitlement to food:

“Starvation is the characteristic of some people not having enough food to eat. It is not the characteristic of there being not enough food to eat.” (Sen A. 1981, Poverty and Famines)

The effect was to move the whole issue of food security out of the realm of the essentially agricultural and place it in a broader context of poverty and lack of development. This resulted in the FAO in 1983 adding the factor of access to those of production and price stability:

“The ultimate objective of world food security should be to ensure that all people at all times have both physical and economic access to the basic food they need. Food security should have three specific aims, namely ensuring production of adequate food supplies; maximizing stability in the flow of supplies; and securing access to available supplies on the part of those who need them.” (FAO.1983. World Food Security: a Reappraisal of the Concepts and Approaches. Director General’s Report, Rome.)

Although access is an important factor in food security it can only prevent hunger if accompanied by stability.

By 1986 and the publication of the World Bank’s report “Poverty and Hunger” another component in the food security picture was making an appearance, namely the time element. Food insecurity could be categorized as either chronic or transitory with the former representing a situation where the lack of food is a permanent feature and the latter describing a temporary shortage.

“Access of all people at all times to enough food for an active, healthy life”.

A further component in the definition of food security concerned the actual quality and type of food supplied and a requirement that it should not merely satisfy protein-energy needs but provide the nutritional balance necessary for a healthy and active life; in addition to this was the recognition of preferences, traditional habits and socially acceptable food types when considering the definition of food security.

The World Food Summit's 1996 definition includes these aspects when it mentions:

“Access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life.”

This generally accepted definition describes what are known as the Four Pillars of food security: accessibility, availability, utilization and stability.

### **Food Availability**

The World Food Program defines availability as “The amount of food that is present in a country or area through all forms of domestic production, imports, food stocks and food aid”. (WFP, 2009, p.170). Riely et al 1995, confirms that the term tends to be applied to food available at a regional or national level rather than at the household level, which can lead to some confusion as the word “availability” sometimes is used at the micro-level.

### **Food Access**

The World Food Summit defines access as having “physical, economic and social access”. Access is still not commonly accepted as an essential part of food security despite Amartya Sen's introduction of the concept in the early 1980s. Many people only consider access within an economic or financial context, particularly since the 2005 Niger food crisis and the start of food price volatility in 2008. The World Food Program defines food access as “A household's ability amount of food regularly through a combination of purchases, barter, borrowings, food assistance or gifts”. (WFP, 2009, p. 170).

Food access consists of three elements, which are physical, economic /financial and socio-cultural. The physical dimension can be illustrated by a situation where food is being produced in one part of a country but an inefficient or non-existent transport infrastructure means that food cannot be delivered to another part suffering from a lack of food.

From the economic viewpoint, food security exists when people can afford to buy sufficient food. The idea that food insecurity arises when food is available but people are unable to afford it is still quite a recent development in the history of food security. A further economic

consideration is the importance of market systems to ensure access to food as OXFAM points out: “Even in rural areas most people, and especially the poor, rely on market systems to provide food and essential goods and services but also for selling their produce”. (OXFAM, 2007).

The third element is the socio-cultural dimension which arises when food may be physically available and the potential consumer has the money to buy the food but is prevented from doing so for being a member of a particular social group or even gender. Social conflict and civil strife can seriously disrupt food production and lead to the loss of livestock for example with direct consequences for a household’s future food security (Riely et al. 1999, 22).

### **Food Utilization**

The World Food Summit’s definition of utilization (the third element of food security) is “safe and nutritious food which meets their dietary needs”. The availability of and access to food on their own are not enough, people have to be assured of “safe and nutritious food”. The food consumed has to provide sufficient energy to enable the consumer to carry out routine physical activities. Utilization also covers factors such as safe drinking water and adequate sanitary facilities to avoid the spread of disease as well as awareness of food preparation and storage procedures.

Utilization therefore covers a range of aspects that hinge on the consumer’s understanding of what foods to select and how to prepare and store them. It is often a mistake to assume that the members of so-called traditional societies know how best to use food resources and it is also a fact that dietary habits (breast-feeding, weaning foods) change very quickly, even for traditional societies.

### **Food Stability**

The World Food Summit says that stability must be present “at all times” in terms of availability, access and utilization for food security to exist. The literature distinguishes between chronic food insecurity where food needs cannot be met over a protracted period of time and transitory food insecurity, where the time period is more temporary (Maxwell and Frankenberger 1992).

#### **2.1.4. Drivers of Food Insecurity**

According to the report of Family Early Warning Systems Network (FEWS NET) and World Food Program (WFP) (2020), In Ethiopia, causes of food insecurity have always been complex given that multiple factors affect food security. In most parts of Ethiopia, the level of rainfall is very erratic and raining in a short period of time (mostly, June to August) and flooding is also a

major problem at this time. In addition, there are increased daily air temperatures throughout the year. These climate changes (weather variability) affect cropping and pasture which reduces crop yield and results in poor dietary diversity and consumption. Hence, erratic rains, uneven distribution, and long dry spells resulted in late planting and poor crop development, poor pasture regeneration, and low water availability are the key drivers of food insecurity which negatively impacts the four pillars of food security in Ethiopia (figure 1). Similar to, civil war has affected the transport and market structure and results in economic disruptions. In addition, in the future, it may be one major source of food insecurity which negatively impacts the four pillars of food security in Ethiopia depending on its spread level throughout the country.

Figure 1. Determinants of each pillar

Source: Al et al. (2008), and Marion (2011).

<b>Food availability</b>	<b>Access of food</b>
Domestic production	Purchasing power
Import capacity	Income of population
Food stocks	Transport and market structure
Food aid	
<b>Stability of supply and access Food utilization</b>	
Weather variability	Food safety
Price fluctuation	Hygiene and manufacturing practice
Political factors	Diet quality and diversity
Economic factor	

The desert locust is also a problem in some areas of Ethiopia which affect crop production and pasture. It spread over in most Dry land area of Ethiopia, across areas of Somali, Afar, eastern lowlands of Amhara, Oromia, and south nation nationalities and people regions because desert locusts would invade a larger extent of lowland and main cropping areas due to high temperatures. Hence, it is one factor that results in food security which directly and indirectly affects the four pillars of food insecurity.

Markets are the major sources of food. However, in most parts of Ethiopia, market prices are not favorable for households, following a persistent increase in cereal prices due to shortages coupled with other factors. The recent spike of food prices, largely driven by a limited supply of

cereals and erupting conflicts in the country, affected households dependent on staple foods. The conflicts have limited the movements of households and their livestock and led to disruptions in the major markets, limiting physical access to food and affecting prices, and continue to affect the food security (IPC, 2020).

In addition, Gebremichael and Asfaw (2019) reported, driving factors of food choice included protracted impacts of past poor seasons, poor household income, cost of nutritious foods, availability of nutritious foods, quality of foods, familiarity with new foods, knowledge on nutritious foods, and health conditions of individuals.

### **2.1.5. Determinants of Household Food Insecurity**

Food security is generally affected by two major determinants: Availability of food and accessibility to it (Andersen, 1997). Same source also showed that human resource development, non-food factors, including education, health care, and clean water; population growth, urbanization and displacement of people greatly influence food insecurity and human nutrition. This source further stipulated that natural resource and agricultural inputs are critical determinants of food security.

Food insecurity is due to a variety of reasons, and the FAO/UNDP (1987) cited in Getachew (1995) suggested, i) the relatively high density of human and livestock populations and the resulting squeeze of land resources; ii) the inability of agricultural practices to sustain the required productivity levels of land; iii) insufficient level of adoption of modern farm technology; iv) extensive and often irreversible levels of land degradation; v) the value placed on livestock, specially cattle, in the social economic system and the accomplishing desire to maintain large livestock holdings.

In a case study of Social and Demographic Characteristics Habro woreda, using logistic regression model, Getachew (1993) showed that there is a statistically significant relationship between resources held by a household and its level of food security. It was confirmed that those households which hold land less than 0.75 hectare, do not own any oxen, have a small household adult equivalent size and earn non-farm income of less than Birr 500 (or nothing at all) are those most at risk of food insecurity among the sample population. Consequently, the researcher showed that the levels of income and farm size are the most important resources determining food security when other factors such as favorable climatic conditions and low pest outbreak are

satisfied. In other words, a larger land size and high income increase the chances of maintaining food security.

Poor target groups often lack access to institutions and services which could help them in improving their subsistence production and income (SLE, 1999; cited in Ayalneh 2002). Moreover, it is a combination of availability, access and the chance of receiving external assistance that determines the households' food security.

Lathan (1997) has clearly indicated that income received from cash crops or wage earnings and prices paid for purchased items influence a rural populations food security. Further, the author stated that inadequate land holdings; landlessness and sharecropping are all potent causes of family insecurity. Lathan has also identified that a 'shock' often precipitates household food insecurity. The shock can adversely influence food production (suddenly threatening farm food availability). There are many different kinds of shocks, like serious illness, which may result in reduced agricultural production in a farm family; loss of rural job; farm production crises, such as failure of the rains, or a plague of locusts or some other agricultural catastrophe. Any crisis that has an adverse impact on the livelihood of the family may also result in household food insecurity

As explained in FAO (1991) the problem of household food security is not simply one of agricultural output, but encompasses all factors affecting a household's access to an adequate year round supply of food. Thus, the problem of household food security is not simply one of next season's crops, but can also include factors as diverse as deforestation, seasonal variations in food supply, availability of fodder and other forest foods, shifts from subsistence to the cash economy, and even the timing of cash needs as school fees.

The same source further showed that agro-ecological induced variation of holding size and plot distribution and ox-ownership, as an important factor in determining household resource endowment and the ability to perform agricultural activities, came out to be factors which determine the food security situation among the sample households. Moreover, other factors that were given due attention in the study were labor, land-to-man ratio, ability of the area to offer cash crop and off-farm income, grazing land, household indebtedness, cash block (off farm employment income, cash crop income, livestock income and borrowing), market price, household expenditure (obligation to the state, rural institution, the household itself and other households).

Ayalneh (2002) in his study of Land Degradation, Impoverishment and Livelihood Strategies of Rural Households in Ethiopia, showed that factors that have contributed to transitory and chronic food insecurity in rural Ethiopia are manifold and varied, ranging from political and socio-economic to environmental. Among the political factors he listed inappropriate agricultural and marketing policies, and political conflict both at national and local level. Among the socio-economic factors are demographic characteristics of rural households, inadequate resource endowments, inadequately developed infrastructure such as school, hospital and roads, etc.

The same source further stated that food security concerns in rural households depend to a large extent on the size and age structure of household members. The number of the household member capable of contributing to food production and/or who can be employed in non-farm income earning activities will greatly determine households own production and its capacity to acquire food through enhancing exchange entitlement.

On the other hand Gezahegn (1995) explained that the major causes of transitory food insecurity are failure in agricultural production or instability in food supplies resulting from stochastic shocks such as recurrent draught, lack of incentives to small scale food producers, and poor extension services for the small peasant households. The weak system of marketing and transport operations to procure and collect agricultural products from widely dispersed rural producers and to distribute essential agricultural inputs on time contributes not only to the fall in production in some years, but also to the problems caused by failure to move the available food itself to needy areas.

Further, while Ayalneh (2002) explaining the feature of food insecure groups, he also implicitly explained the factors that determine food insecurity. In that the largest group of food insecure households is those who live on the edge of subsistence, often located in remote areas far from markets. They lack the important asset of good quality land and access to productive assets.

Lack of draught power severely handicaps farmers, as doe's lack of access to credit, agricultural input and technology. Lack of male labor in female-headed households is another important constraint. They usually work in an insecure and low productivity occupation.

Another determinant of food insecurity is gender discrimination. Subordination of women in society, their over-burdening and the greater difficulties faced by female-headed households contribute to food insecurity (Lathan, 1997).

Getachew (1993) in a case study of Adama Boset reported that there are statistically multiple relationships between resources owned by a household and level of food security. Accordingly, it was confirmed that amongst the sample population it is those households which hold land less than or equal to 3 Timads, do not own any oxen, have a small household adult equivalent size, are unable to use fertilizer, and earn a non-farm income of less than Birr 500 (or none at all) which are most at risk of food insecurity. Thus ox-ownership, level of income and land size are the most important resources determining food security when other factors such as favorable climatic conditions and low pest outbreak are satisfied. In other words, an increased size of land, ox-ownership, high income and use of fertilizer increase the chances of maintaining food security.

In his study of Kembata and Hadiya district Getachew (1993) tested the significance of the relationship between household resources and food security. For the test he included six variables viz, farming systems, land size, production output, livestock, household size and fertilizer. Using logistic regression model (logit for short), he showed that there is statistically significant relationship between food insecurity and each of the above determinants except farming system. Moreover, in this study all the variables are negatively related with food insecurity except household size.

According to Hoddinott (2001) HFS issues cannot be seen in isolation from broader factors. He viewed these factors as physical, policy and social environment. And he argued that the physical factor play a large role in determining the type of activities that can be undertaken by rural households. Government policies on the other hand toward the agricultural sector will have a strong effect on the design and implementation of household food security interventions. Likewise the presence of social conflict, expressed in terms of mistrust of other social groups or even outright violence, is also an important factor in the design and implementation of interventions.

#### **2.1.6. Food Insecurity in Ethiopia**

Food insecurity incorporates low food intake, variable access to food, and vulnerability a livelihood strategy that generates adequate food in good times but is not resilient against shocks. These outcomes correspond broadly to chronic, cyclical and transitory food insecurity, and all are endemic in Ethiopia. The main triggers of transitory food insecurity in Ethiopia are drought and war. Seasonality is a major cause of cyclical food insecurity. Structural factors contributing

to chronic food insecurity include poverty (as both cause and consequence), the fragile natural resource base, weak institutions (notably markets and land tenure) and unhelpful or inconsistent government policies.

Ethiopia has been structurally food deficit since at least 1980. The distinction between transitory and chronic food insecurity is increasingly blurred. A subgroup of virtually asset less rural Ethiopians is emerging who are subjected to all forms of food insecurity. They cannot meet their food needs even under ideal weather conditions, they suffer seasonal hunger and malnutrition, and they are acutely vulnerable to famine in years of low or erratic rainfall. Less well understood than the immediate impact of drought on rural livelihoods is the impact of repeated droughts on long term food insecurity. Two vicious cycles are at work: recovery (e.g. of herds) from food crises is cut short by the next drought, and the threat of drought - which occurs frequently but is unpredictable in its timing and severity - inhibits investment in productivity-enhancing agricultural inputs, because the downside risk for marginal farmers is too high.

Current conventional wisdom on food insecurity in Ethiopia asserts that the problem can be simply conceptualized, as follows:

Landholdings are too small - although (or because) unusually evenly distributed - to allow Most farming households to achieve food production self-sufficiency;

Population increase reduces landholdings further and places intolerable stress on an already fragile natural resource base;

Soil fertility, already very low, is declining due to intensive cultivation and limited application of yield-enhancing inputs;

Recurrent droughts add food production shocks to abnormally low yields;

Limited off-farm employment opportunities restrict diversification and migration options, leaving people trapped in increasingly unviable agriculture.

Yet agricultural failure is only part of the story. Following Chambers (1983), analysts of food insecurity in Ethiopia can be divided into two groups: the physical ecology cluster, which focuses on population growth, declining soil fertility and drought, and the political economy cluster, who blame government policies, weak markets and institutional failure. Both the 'malthusian' and governance approaches have some merit as partial explanations, but neither is sufficient in itself. A holistic livelihoods analysis is needed.

### **2.1.7. Livelihood Strategies and Food Insecurity**

What is important to be noted is that vulnerability and poverty go hand in hand. One feature of poverty is the inability to recover from sudden shocks such as losing a job, becoming ill or a poor harvest. In the context of sustainable livelihood approach, vulnerability includes: long-term trends (such as demographic trends, e.g. migration, or changes in the natural resource base); recurring seasonal changes (such as prices, production or employment opportunities); short-term shocks (such as illness or disease, natural disaster or conflict) (DIFD, 2001).

The livelihoods approach seeks to promote choice, opportunity and diversity. This is nowhere more apparent than in its treatment of livelihood strategies- the overarching term used to denote the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals (including productive activities, investment strategies, reproductive choices, etc.) (DIFD, 2001).

The same source further stated that some version of livelihood analysis uses the term ‘adaptive strategy’, instead of ‘livelihood strategies’. Adaptive strategies are distinguished from coping strategies adapted in times of crisis.

Again this source elaborated that recent studies have drawn attention to the enormous diversity of livelihood strategies at every level- within geographic areas, across sectors, within households and over time. This is not a question of people moving from one form of employment or ‘own account’ activity (farming, fishing) to another. Rather it is a dynamic process in which they combine activities to meet their various needs at different times. A common manifestation of this at the household level is ‘straddling’ where by different members of the household live and work in different places, temporarily (e.g. seasonal migration) or permanently. Social patterns such as this clearly complicate and underline the importance of viewing households and communities within their wider context. Since goods, financial resources and people are all mobile, an accurate picture of livelihoods cannot be gained if artificial boundaries are drawn. Thus links between urban and rural centers will need to be explored, as will the implications for decision-making and asset usage of split families.

The more choice and flexibility that people have in their livelihood strategies, the greater their ability to withstand-or adapt to-the shocks and stresses of the vulnerability context (Kostas ET al.2001).

## **2.2. Empirical Studies on the Determinants of Food Insecurity.**

Several studies were carried out to identify the determinants of food insecurity in many different contexts using different variables and analytical techniques. Those studies have considered variables related with household characteristics such as family size, gender, educational attainment and age of household head; economic variables such as size of the land holding, nature of the ownership of the assets, off farm/ non-farm income sources, consumption pattern, food and input prices; and others related to markets and infrastructures such as access to markets, availability of marketing infrastructures and roads, extension services, etc. Findings from selected studies have been reviewed below.

A study by Bashir et al. (2013) in Pakistan revealed that livestock assets, education, no. of income earners in a household have a positive impact while family size and household heads' age had a negative impact on food security. Sultana (2011) in Pakistan found that place of residence (Urban) and dependency ratio has a significant and negative effect while educational attainment level of household's head beyond intermediate level has significant and positive impact on food security status of household. Faridi and Wadood, (2010) in Bangladesh showed that total land owned by the household, electricity connection, household size, household heads' occupation, and safety net programs had a strong impact on food security situation.

Joshi et al. (2012) in Nepal demonstrated that family size, operational landholding and livestock holding were important determinants of food insecurity, whereas, dependency ratio and occupation were important determinants of income poverty. Education of household head and landholding were important determinants for both income and consumption poverty. Maharjan and Joshi (2012) concluded that the main factors contributing to food insecurity in Nepal were limited access to resources, illiteracy, big family size, higher dependency ratio, dependency on agriculture with small landholding, limited access to irrigation and fertilizer, and dependency on wage labor. With these characteristics, the highest proportion of occupational caste households and households in the mountain and hill were chronically food insecure.

Empirical findings in Ethiopia pointed out that total income of the households increases their likelihood of being food secure (Mitiku et al., 2012; Goshu et al., 2012; Hussein & Janekarnkij, 2013; Ahmed, 2015). Households with more income can easily purchase food items that are required by the farm family. In addition, farm income of rural households also found to improve their food security because higher farm income helps the farmers to purchase food items as well as to invest in demand pull activities to improve their food security status (Amsalu & Beyene,

2012; Buom, 2013). Having more off-farm income increases households' probability of food security status (Mitiku et al., 2012; Beyene & Muche, 2010; Zelalem, 2014; Abdirahman, 2015; Amsalu & Beyene, 2012). As opposed to this, Indris (2012) revealed that non-farm income decreases the likelihood of households' food security. Having access to off-farm and non-farm employment activities also found to have positive effect on households food security (Jemal & Kim, 2014; Gemechu et al., 2015). Different studies also have shown that access to credit, borrowing and credit worthiness of households increases the likelihood of households' food security (Okyere et al., 2013; Girma, 2012; Zelalem, 2014). Having better access to credit helps the farmers to produce more through purchase and use of agricultural inputs as well as help urban and rural households to engage in other income generating activities so that the income from these activities position households on a better status to escape vulnerability to food insecurity. As opposed to this, Jemal & Kim (2014) found that access to credit decrease the likelihood of households' food security. Moreover, many studies indicated that remittance, gifts and food aids found to increases the likelihood of household's food security status (Abdirahman, 2015)

Indris (2012) carried out study on assessment of food insecurity, its determinants and coping mechanism among pastoral household of afar national regional state the case of zone one, Chifra district. Logistic regression model was applied in the study and found that large family size, dependency ratio, age of the household head affect food insecurity positively where non-farm income affect household food security negatively.

Mohammed (2015) carried out a study on Intensity and determinants of pastoral household food insecurity in Harsh in district, Somalia regional state of Ethiopia. The findings show that there was a significant mean difference between food secure and food insecure households in terms of age of household head, household size, dependency ratio, livestock holding and food expenditure. The binary log it model outputs revealed that family size, age of the household head, dependency ratio, and livestock holding were factors significantly associated with food insecurity situation of households. Assefa Agidew and K. N. Singh (2018) studied on Determinants of food insecurity in the rural farm households in South Wollo Zone of Ethiopia: the case of the Teleyayen sub watershed The results of the binary logistic regression confirm that the variables such as age of household head, family size, number of agricultural labor force, off-farm income, relief support/food aid, farming experience, and agro-ecological zone were key determinant causes of rural household food insecurity. Especially, the age of household head,

family size, off-farm income, relief support (food aid), and agro-climatic zone had a negative influence on food security of the rural households. Other variables of significance, namely number of the agricultural labor force and farm experience, were found to exert a positive impact.

Hiwot Yirgu Astemir (2014) studied on Determinants of Food Security in Rural Farm Households in Ethiopia the results of the conditional logit model, among the priority variables fitted in to it, rainfall shock and household size negatively and significantly determine food security. While farmland size, land quality and credit access positively and significantly determine food security at varying levels of significance. In the fixed effects model these same sets of variables significantly determine nutritional status in the same sign as they determined food security with only differences in magnitude and significance of the coefficient estimates. Additionally, off farm income, fertilizer use and oxen ownership are priority variables that are found to be significant in this model. The results of the ordered probit model also reinforce the findings in the two models with only differences in magnitude and significance.

Tsegamariam Dula and Wakjira Berhanu (2018) studied on Determinants of Rural Household Food Security and Coping up Mechanisms in the Case of Woliso Woreda Western Ethiopia. The binary probit model showed that, ceremonial expense, livestock, dependency ratio, educational level and pesticide use were found to be statistically significant determinants of food insecurity status. Ceremonial expense and dependence ratio were positively significant level respectively, while livestock, household head education and pesticide use were found significance.

Socio-economic factors such as low level of income (income constraint), low level of education, low level of access to new technology such as improved seeds, chemical fertilizer, herbicide, pesticide, high expenditure for social ceremonies and celebrations. In addition to this, the weakness of institutional factors also one of the hindered for food self-sufficiency to rural household, such as absence of enough rural financial institutions, poor market integration and problem of land distribution by local leaders were the main challenges of the study area farmers not to have sufficient cereal production to their family members.

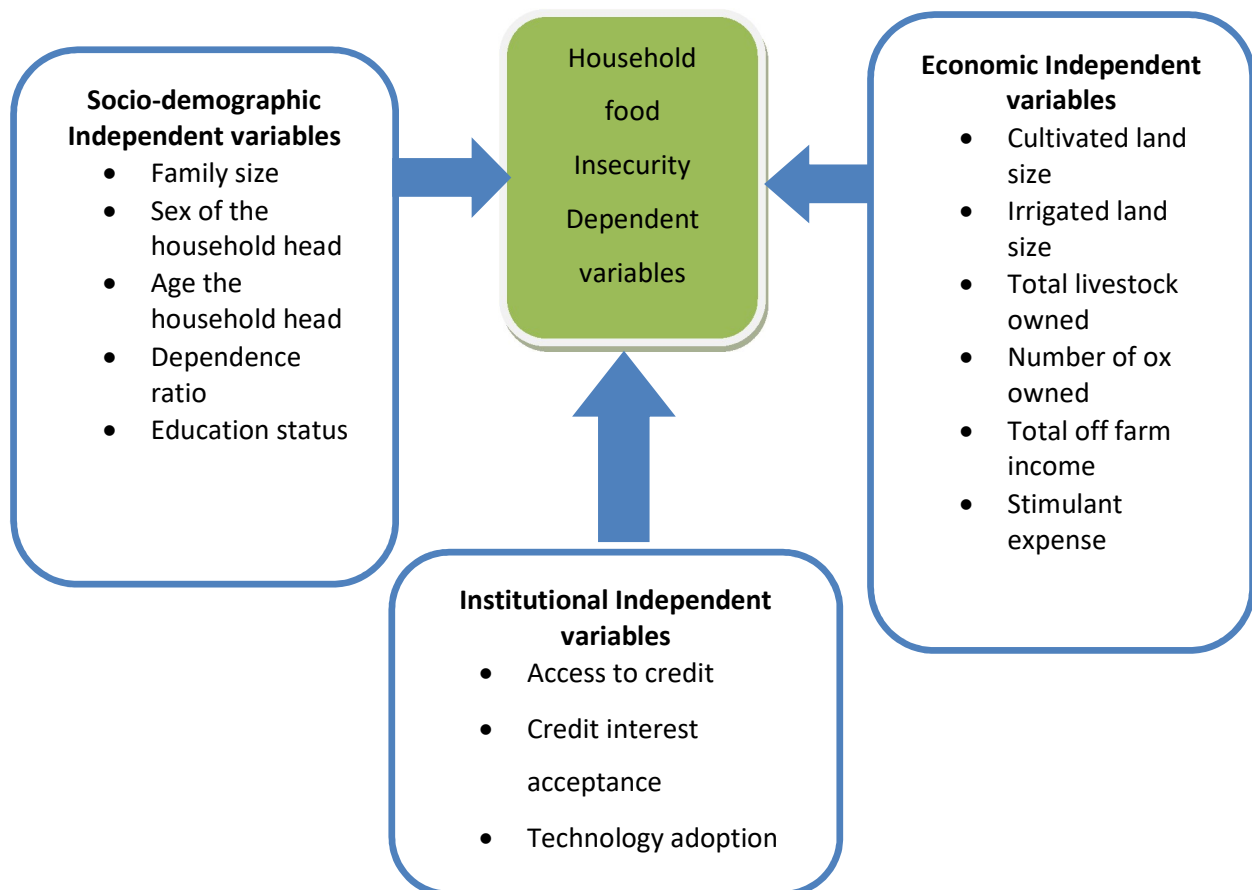
### **2.3. Conceptual Framework of the Study**

This study will be made based on a conceptual framework drawn from both theoretical and empirical literature reviewed above. Most researchers listed in empirical literature review used the independent variables are; family size, age of the household head, dependency ratio,

education of the household head, cultivated land size, credit access, Credit interest acceptance, number of livestock owned, off farm income, sex of household head, technology adoption, number of ox owned , stimulants expense and irrigated land size. From the listed independent variable the researcher takes 11 independent variables and add new 3 independent variables that does not studied in previous researcher i.e., Credit interest acceptance, stimulants expense, irrigated land size. The food insecurity status from this are 14 independent variables are attended and show by using binary logistic regression model in various research literatures is clearly identified. Hence, this study was derived important gap and variable based on the information found in the related literature.

Accordingly, the following conceptual framework is depicted to show the relationship between the Dependent variable and the independent variable as follow:

**Figure 1 Conceptualizing the Determinant of Y**



Source: from Different theoretical and Empirical literatures and modified by the researcher (2024)

# CHAPTER THREE

## 3. RESEARCH METHODOLOGY

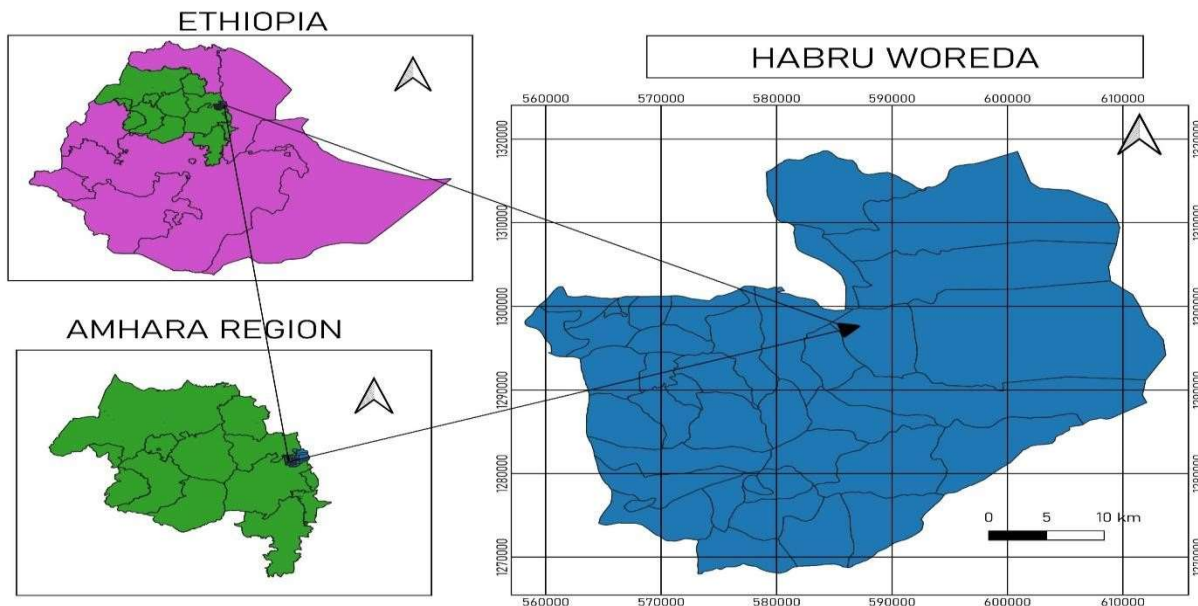
### 3.1. Description of the Study Area

The study was conducted in Habru woreda, located in the North Wollo Zone of the Amhara region, Ethiopia. The city within the woreda is Mersa Town, situated 30km south of Woldiya, 395km east of Bahirdar, and 491km north of Addis Ababa.

The geographical coordinates of the woreda range from 39°53' to 40°E longitude and 11°46' to 11°93'N latitude, with an elevation ranging from 898m to 3195m above sea level. The woreda is situated within the Awash basin and consists of 39 kebeles. In terms of topography, the woreda spans elevations between 500–3200 meters above sea level.

The climate of the area is classified as Dega (2.34%), Weyna Dega (40.56%), and Kola (57.1%). The woreda experiences its coldest season in summer and warmest season in autumn, with maximum temperatures reaching 28.5°C in the warmest season and 15°C in the coldest season, resulting in a daily average temperature of 25°C. The annual rainfall in the study area varies significantly, with low rainfall from February to May and high rainfall from June to September. The mean annual rainfall ranges from 700mm to 1000mm.

Figure 2 The Location Map of Habru Woreda (Study Area)



### 3.2. Research Design

The objective of the study is to examine determinants of rural household food insecurity in Habru woreda

### 3.3. Methods of Data Analysis

Descriptive statistics and an econometric model were utilized to analyze the data. Descriptive statistics, such as the mean, standard deviation, maximum, and minimum, were employed to summarize the results. A binary logistic econometric model was used to examine the relationship between household characteristics and food security status.

### 3.4. Data Types and Sources

Both primary and secondary data was collected from different sources to identify important variable that may affect household food insecurity. To generate primary data, a semi structured questionnaire used to collect quantitative and qualitative data through a household survey involving household heads and their spouses.

Secondary, data were collected from published and unpublished sources and used for this study.

### 3.5. Population and Sample

The sampling design supposed to employee would be probabilistic sample. The total population size of the district is 283,330, the total number of HHs 57,004 and the numbers of Kebeles are 39 (Source: Habru ARDO, plan commission, 2024). The determination of sample size would be resolved by means of Yemane (1967) sample formula with 95% confidence level.

$$n = \frac{N}{1+N(e^2)} \text{-----}7$$
$$n = \frac{8155}{1+8155(0.05^2)} = 381$$

Where n= Sample size; N= size of the population and e= desire significance level.

The total number of HHs in the selected kebele is 8155 and the significance level is 5%, then the sample size was 381 (Habru woreda, ARDO).

Two stage of random sampling procedure used. At the first stage, by using Stratified Sampling categorize the kebeles of the Woreda in to three strata based on the agro-ecology nature of the district i.e. 8 PAs out of the 39 PAs of the study area would be randomly selected. In The second stage, stratified sampling followed by simple random sampling probability proportional to simple random sampling technique would be employed to draw sample households from the selecting sample PAs.

Table 1 Sampling Strata

No	Stratum	Number of kebeles under the stratum	Method used to select kebeles	Actual kebeles under the stratum used for random sampling
1	Lowland	23	$(23/39)*7=4$	4
2	Temperate	15	$(15/39)*7=3$	3
3	Highland	1	$(1/39)*7=1$	1

After simple random method would be employed and known the Kebeles, the share of each Kebeles decide proportionate to their total households and eventually the sample households selecting again with simple random sampling methods among the villages (table 2).

Multistage sampling is a crucial method in survey research and data collection. It allows researchers to efficiently gather data from large and diverse populations by breaking down the sampling process into multiple stages. This approach helps ensure that the sample is representative of the entire population, leading to more accurate and reliable results. One of the key advantages of multistage sampling is its ability to handle complex sampling designs and large populations.

Table 2 Sampling kebele Population and Household Data

No	Kebele	Population	Number of households	Sample households
1	Diraroka	9876	1632	107
2	Haro	8690	868	57
3	Tilifa	7250	1430	94
4	Dana	8974	836	55
5	Gerado	3590	752	49
6	Abiot fira	6955	771	51
7	Goshwoha	4662	887	58
8	Merto	3111	979	80
	Total	11108	8155	381

Source: Updated kebele records, 2024

### **3.5.1. The Household's Food Insecurity Status Determination**

Food insecurity status at the household level is measure by direct survey of total wealth (computing the value of the household's wealth in monetary terms) of the farmers and comparing it with the minimum subsistence requirement of wealth.

The methodology of classifying a given household as food secure or food insecure depends on the minimum acceptable weight average food requirement of 2100 kcal per adult equivalent per day which is estimate to be 225 kg of food (grain equivalent per person per year) set by the Ethiopian government. Having identifies the food insecure and food secure groups of households, the next step were identified the socio-economic characteristics that are determinant with food insecurity.

### **3.5.2. Econometric Model**

There are alternative econometric models popularly used in many studies where the dependent variable takes dichotomous values like the logistic regression, the probit model, and the normal log-linear regression model, to mention a few. The logit and probit models are the most commonly used binary response models used to establish a relationship between household demographic and livelihood capitals with a dichotomous response variable (food insecurity in our case) (Gujarati, 1988; Maddala, 1993).

As indicate by Gujarati (1995), the probit model can substitute logistic regression model. Despite their quite comparable formulations, their chief difference lies in that the later has a slightly flatter tail than the cumulative normal distribution that is the probit curve approaches the axes more quickly than the logistic curve. Although logit and probit models produce similar parameter estimates, a binary logit regression model is the appropriate and prefer probability model recommended mostly from mathematical point of view, as it is extremely flexible for interpreting binary response dependent variables (Feder et al., 1985). Hence, binary logit model would be used to analyze the relationship of household's food insecurity status and its determinants.

The dependent variable  $y$  were defined to indicate whether a household were food insecure or not. In this case, we can let  $y=1$  denote a household were food secure and  $y=0$ , otherwise.

FODINS = household food insecurity

- FASZ = family size
- AGE = age of the household
- DPR = dependency ratio
- EDUC = education of the household
- CLSZ = cultivated land size
- ATC = Access to credit
- TLU = total livestock owned
- TOFIN = total off farm income
- SHLD = sex of household head
- NOX = number of ox owned
- TEAD = technology adoption
- STMEX = stimulants expense
- IGLS = Irrigated land size
- CIA = Credit interest acceptance
- $U_i$  = disturbance term

Hence, the probability of a household being below poverty line is given by:

$$P(Y_i = 1) = \frac{\exp(X_i\beta_i)}{1 + \exp(X_i\beta_i)} \text{ or } \frac{e^{Y_i}}{1 + e^{Y_i}} \text{ ----- 1}$$

And the probability of a household being above poverty line (1 - p) is given by:

$$P(Y_i = 0) = \frac{1}{1 + \exp(X_i\beta_i)} \text{ or } \frac{1}{1 + e^{Y_i}} \text{ ----- 2}$$

**Multi-co linearity test:** According to Gujarati (2003), although there are no unique methods of detecting or measuring multi-co linearity strength, there are several indicators of multi-co linearity. The existence of those were testing using the methods of Variance Inflation Factor and the contingency coefficients analysis.

To compute VIF, continuous explanatory variables were regressed on all other continuous explanatory variables and coefficients of determination were computed. The familiarly using measure to detect multi-co linearity using VIF mechanism is formulating as:

$$VIF(X_i) = \frac{1}{1 - R_j^2} \text{----- 4}$$

A rise in the value of  $R_j^2$  implies an increase in the degree of multi-co linearity which leads to an increase in the variances and standard errors of the OLS estimates. Indeed, a value of  $VIF > 10$  (if  $R_j^2$  exceeds 0.95) is a signal for the existence of severe multi-co linearity (Gujarati, 2003).

When the variables to be investigating will be discrete in nature, Contingency Coefficient (CC)

is use  $C C = \sqrt{\frac{\chi^2}{N + \chi^2}}$  -----5

Where, C = coefficients of contingency

$\chi^2$  =Chi-square random variable

N = total sample size.

If CC is greater than 0.75, the variables are said to be collinear.

**Hetero-scedasticity test:** The presence of hetero-scedasticity resulted in inconsistent estimates of the parameters in the model. In fact, it is not logical to establish confidence intervals and test hypotheses based on the usual t and F tests because of unnecessarily larger variances and wider confidence intervals when the model is hetero-scedastic. In short, if we persist using the usual testing procedures despite hetero-scedasticity, whatever conclusions we draw or inferences we make may be very misleading. Hence, the presence of hetero-scedasticity were tested (Gujarati, 2003).

**Linearity of independent variable and odd log**

One of the critical assumptions of logistic regression is that the relationship between the logit (aka log-odds) of the outcome and each continuous independent variable is linear.

Logit (p) =  $\log\left(\frac{p}{1-p}\right)$  ----- 6

The logit is the logarithm of the odd ratio, where p= probability of a positive outcome.

The Box-Tidwell test used to check for linearity between the predictors and the logit. This is done by adding log transformed interaction terms between the continuous independent variables and their corresponding natural log in to the model.

**3.6.Estimation Tool**

After the analytical procedures are clearly delineates it would be necessary to identify the potential explanatory variables that would influence household food insecurity. Review of literatures, past research findings, experts and author’s knowledge of the food insecurity situation of the study area used to identify the potential determinants of household food insecurity. To this research the estimation tools are necessary, so STATA model estimation would be used in the research. Therefore, assigning the household food insecurity as the dependent variable, the

following variables would be selected to analyze whether they explain household's food insecure or not.

**Household food insecurity (FODINS):** is a dichotomous dependent variable in the model and it takes 0 if the household were food-insecure, 1 otherwise. The information, which identifies the food secure from the food insecure, would be obtaining by comparing the total food calorie available for consumption in the household per AE to the minimum level of subsistence requirement per AE (2100 kcal). Household beyond this threshold would be food secure, otherwise not.

**Independent variables:** Variables expecting to influence rural food insecurity as well as their codes and definitions are given below. Earlier researchers have identified several independent variables that determine household food security status. The major variables that would be expected to have positive or negative influence on rural household food insecurity are mention below.

**Family size in number (FASZ):** It is a continuous variable, which determines the household food insecurity status in the study area. As the family size increases, the number of mouths to be fed obviously increases which shares the available food in the household. Hence, it would be hypothesize that family size and food insecurity in the study area would have positively relation.

**Age of the household head (AGE):** It is a continuous variable, age matters in any occupation. Rural households mostly devote their live time or base their livelihoods on agriculture. The older the household head, the more experience he has in farming and weather forecasting. Moreover, older persons are more risk averters, and mostly they intensify and diversify their production activities. As a result, the chance for such household to be food insecure will be less. In light of this, it would be hypothesizing that age of the household head and food insecurity would have positively /negatively correlate in the study area.

**Dependency ratio (DPR):** Dependency ratio is obtained by dividing inactive labor force (age less than 15 and above 65) by the active labor force (age between 15 and 65) with in a household. When a large household size corresponds with the availability of adequate adult labor, it can have a positive effect. But a household with more inactive productive labor force compared to the active age shows a high dependency ratio and it is more likely to be food insecure (BIGSTEN et al., 2002). Therefore, it is hypothesized that dependency ratio and food security are positively associated

**Education level of the household (EDUC):** Education household head is a dummy variable taking value 1 if the household head is literate, 0 otherwise. Education equips individuals with the necessary knowledge of how to make living. Literate individuals are very ambitious to get information and use it. Agricultural production technologies and inputs are always coming up with better knowledge. So if the household head would have literate he would be very prone to accept extension services and soil and water conservation practices including any other income generating activities. As a result it would be expected that education to would have negative impact on food insecurity.

**Cultivated land size (CLSZ):** Cultivated land size is a continuous variable. Production output is increases either by intensive or extensive. As the cultivated land size increases, provide other associated production factors remain normal, the likelihood that the holder gets more output would be high. So that households who have large cultivated land size can has a better option to diversify production and to increase its production so such a household would be in a better position in its food security status. Consequently it would be hypothesize that the larger the cultivated land the less would be the chance to be food insecure and would have negatively relationship with food insecurity.

**Access to credit (ATC):** Credit is a dummy variable and an important source of income. Those households who access to credit they want have better possibility they purchase agricultural input (improved seed, fertilizer, etc.,) or they purchase livestock for resale after they fat them. All these activities increase income of the household. Hence it would be expected that credit would have a negative impact on food insecurity.

**Total livestock owned (TLU):** Total livestock owned is a continuous variable. It is the total number of livestock holding of the household measure in livestock unit. Livestock play a major role in food security. Livestock are source of income for farming households. Households who have better possession of livestock are expecting to be less vulnerable to food insecurity. This is so because livestock directly or indirectly contribute to household food security. The direct contribution includes meat, milk and egg for direct consumption in the household and the indirect contribution of livestock to household food security includes the draft power, manure and income from sales of livestock and livestock products which are often use for purchase of

food grains during times of food shortage in the household. Therefore, it would be expected that livestock holding would have a negative impact on food insecurity.

**Total off farm income (TOFI):** It is a continuous variable. Crop production output and income earning from sales of livestock and livestock products is inadequate in the farming households of the study area and often look for other income source other than agriculture to push them to the threshold of securing access to food security. As a result it would be expected that households who manage to earn higher off farm income would have less likely to be food insecure. i.e., off farm income would be expected to have a negative impact on food insecurity.

**Sex of household head (SHLD):** Dummy variable taking value 1 if the household head is male, 0 otherwise. With regard to farming experience males are better than the female farmers. So sex of the household head is an important determinant of food insecurity in the study area. Therefore, it would be hypothesize that negatively/positively likely to be food-insecure.

**Number of ox owned (NOX):** It is a continuous variable. There is a symbolic relationship between crop production and ox ownership in the mixed farming system. Oxen provide manure and draught power to crop cultivation therefore used to boost crop production. As a result, it would be expect that number of oxen owned and food insecurity would be negatively relationship.

**Technology adoption (TEAD):** This is a dummy variable for which value label 1 is if the household adopt technology like chemical fertilizers, pesticides, and improved seed varieties; and 0 otherwise. Here chemical fertilizer will be taking as a proxy for technology adoption as the rest of technologies would have insufficiently make available for farm households. The prior expectation is that households who adopt the existing technologies would be expecting to be food secure than those who didn't adopt. Technology adoption would have negative relationship with household food insecurity.

**Stimulants expense (STMEX);** it is a continuous variable, refers to the total money of household spending on chewing chat, smoking cigar ate, ganja (local name) and other traditional stimulants and measure in money. Households that expense more stimulant money would be food insecurity than other that has expense less money and would have expecting to positive relationship with food insecure.

**Irrigated land size (IGLS):** Irrigated land size is a continuous variable. Production output is increases either by intensification. As the irrigated land size increases, provide other associated

production factors remain normal, the likelihood that the holder gets more output would be high. So that households who have large irrigated land size can have a better option to diversify production and to increase its production so such a household would be in a better position in its food security status. Consequently it would be hypothesized that the larger the irrigated land the less would be the chance to be food insecure and would have a negative relationship with food insecurity.

**Credit interest acceptance:** interest acceptance is a continuous variable and an important source of income. Those households who receive the credit they want have to pay interest, so households should accept credit interest for better possibility they purchase agricultural input (improved seed, fertilizer, etc.,) or they purchase livestock for resale after they fatten them. All these activities increase income of the household. Hence it would be expected that credit interest acceptance would have a negative impact on food insecurity.

Table 3 Summary of Variable Definition, Measurement and Hypothesis

Variable	Label	Measurement	Hypothesis
Dependent variable			
Y= Household food insecurity	FODINS	1 if the household food secure, 0 other wise	
Independent variable			
X <sub>1</sub> = family size	FASZ	Continuous; number of members of a household	±
X <sub>2</sub> = Age of the household head	AGE	Continuous; age in years	±
X <sub>3</sub> = Dependency ratio	DPR	Continuous; number of dependent family in a household	+
X <sub>4</sub> = Education	EDUC	1 if the household literate, 0 other wise	-
X <sub>5</sub> = Cultivated land size	CLSZ	Continuous; measured in hectare	-
X <sub>6</sub> = Access to credit	ATC	Dichotomous; 1= yes; 0= otherwise	-
X <sub>7</sub> = Total livestock owned	TLU	Continuous; measured in TLU	-
X <sub>8</sub> = Total off farm income	TOFIN	Continuous; measure in number	-
X <sub>9</sub> = Sex of household head	SHLD	dichotomous variable; 1= Male; 0= female	±
X <sub>10</sub> = Number of ox owned	NOX	Continuous; measure in number	-
X <sub>11</sub> = Technology adoption	TEAD	Dichotomous; 1= yes; 0= otherwise	-
X <sub>12</sub> = Stimulants expense	STMEX	Continuous; measured in Ethiopian Birr	+
X <sub>13</sub> = Irrigated land size	IGLS	Continuous; measure in hectare	-
X <sub>14</sub> = credit interest acceptance	CIA	Dichotomous; 1= yes; 0= otherwise	-

Source: Own computation, 2024

## CHAPTER FOUR

### 4. RESULT AND DISCUSSION

The data analysis was done by using STATA 14.2 software package. The descriptive analysis made use of tools such as mean, percentage, standard deviation and frequency distribution. In addition, econometric analysis was used to identify the determinants of food insecurity.

#### 4.1. Measuring Household Food Insecurity Status

To measure food insecurity status the researcher used a set of 14 explanatory variables (9 continuous and 5 discrete) were included in the model and used binary logistic regression analysis. These variables were selected on the basis of theoretical explanations and the results of various empirical studies. These variables are family size, age of the household, dependency ratio, cultivated land size, irrigated land size, total livestock owned, number of ox owned, total off farm income, stimulant expenses, sex of the household head, education level of the household head, technology adoption, access to credit and credit interest acceptance. Out of 381 total samples 232 sample households were found to be food insecure and 149 households were food secure (Table 4). In other words 60.89 percent and 39.11 percent of the sample households were food insecure and food secure, respectively.

TABLE 4 FOOD INSECURITY STATUS IN HABRU DISTRICT

Food insecurity status	Frequency	Percent	Cumulative
Food insecure	232	60.89	60.89
Food secure	149	39.11	39.11
Total	381	100	100

Source: survey result, 2024

#### 4.2. Demographic and Socio-economic Characteristics

Households' food insecurity is determined by various household characteristics. Of these characteristics demographic and socio-economic attributes are among the list. Thus, this section presents the demographic and socio-economic characteristics of sample households by namely family size, dependency ratio, educational level of the household head, sex of household head, age of the household head, cultivated land size, irrigated land size, off farm income, technology adoption, number of ox owned, total livestock owned, stimulant expenses, cultivated land size and access to credit.

#### **4.2.1. Household Food Insecurity and Family Size**

Family size was considered as one of the potential variables that would have due contribution for household food insecurity. The results reveal that average family size for the study area is 4.82 persons per household which is greater than that of the national average, i.e. 4.5 persons. As depicted in (Table 5), the food insecure households have larger average family sizes 5.23 and the food secure group has relatively smaller average family size 4.18. Households with larger family size were more likely to be food insecure. The largest family size of the sample households was 9 and the smallest was 1 (Table 5). The survey result indicated that there are significant differences between food insecure and food secure household at 1% probability level.

#### **4.2.2. Household Food Insecurity and Age of the Household head**

The mean age of the household in the study area was found 53.99 year. The young household head 27 age whereas the older is found 80 years. The descriptive statistics shows that the mean value of food insecure households age 52.48, and the food secure groups 56.34 age this implies that when the age of the household increase the other variables constant the probability of food insecure decrease. Hence old age households food secure than the young one, due to the past experience of the older and have high cultivated land size comparing to the young household. Age of the household head have negative correlation with food insecurity. The survey result indicated that there are significant differences between food insecure and food secure household at 1% probability level.

#### **4.2.3. Household Food Insecurity and Dependency Ratio**

The family with relatively large number of dependent family members (high dependency ratio) has a direct relation with household poverty status. The results show that average dependency ratio for the study area is 0.226 per household; the mean values of dependency ratio for food insecure and food secure household are 0.26 and 0.17, respectively (Table 5). The result shows that households with large economically non-active family members tend to be poorer than those households with small dependent family members, because rural households engage in agriculture and requires high labor forces due to this large number of dependent family have high dependency burden. The survey result indicated that there are significant differences between food insecure and food secure household at 1% probability level.

#### **4.2.4. Household Food Insecurity and Cultivated Land Size**

The mean cultivated land size was found 0.9 hectare. The descriptive result shows that the mean

of food insecure household 0.8 hectare whereas 1.07 hectare mean were food secure households the mean difference between food insecure and food secure households were 0.27hectar. The result shows that cultivated land size have negative correlation with food insecurity. This implies those households have large cultivated land size were lower probability of failing in food insecurity. The survey result indicated that there are significant differences between food insecure and food secure households at 1% probability level. Cultivated land size has a minimum 0.25 and a maximum 1.5 hectare.

#### **4.2.5. Household Food Insecurity and Irrigated Land Size**

The mean irrigated land size was found 0.06 hectare. The descriptive result shows that the mean of food insecure household 0.05 hectare whereas 0.09 hectare mean were food secure households the mean difference between food insecure and food secure households were 0.04 hectare. The result shows that irrigated land size have negative correlation with food insecurity. This implies those households have large irrigated land size were lower probability of failing in food insecurity. The survey result indicated that there are significant differences between food insecure and food secure households at 1% probability level. Cultivated land size has a minimum 0 and a maximum 0.5 hectare.

#### **4.2.6. Household Food Insecurity and Total Livestock Owned**

Livestock production plays an important role both in the crop producing of the study area. Livestock provide milk, meat, traction power and transport. Livestock that are owned by the sample households include camel, cattle, sheep and goat, equine and poultry. The relationship is statistically significant at 1 percent probability level and has negative correlation with food insecurity. The mean of livestock was found 2.27. Whereas the mean value of food insecure and food secure households were 2.04 and 2.63 respectively this is an indication that ownership of livestock acts as a hedge against food insecurity in the study area. The possible explanation is that livestock besides its contribution to the subsistence need and nutritional requirement and crop production by provision of manure, it also serves as accumulations of wealth so that disposed during times of need, especially when food stock in the household deteriorate.

#### 4.2.7. Household Food Insecurity and Total Off farm Income

The mean of off farm income if found 9606 Br. The descriptive result shows that the mean for food insecure and food secure household were found Br 8658 and 11083.15 respectively. Off farm income have negative correlation with food insecurity and has 1% level of significance. This implies that a household that generate off farm income was food secure that does not engage in off farm income. The minimum and maximum value of off farm income was Birr 5000 and 21000 respectively (table 5).

#### 4.2.8. Household Food Insecurity and Number of Ox Owned

It provides substantial non-human labor and manure to the soil. With regard to the contribution of labor, oxen ownership is an important variable. Ox have negative correlation with food insecurity and significant at 1% probability level. It shows that a household have ox the probability of food insecure is low. The mean value of ox was found 1.03. The mean of food insecure and food secure households were 0.95 and 1.14 respectively (Table 5).

#### 4.2.9. Household Food Insecurity and Stimulant Expenses

Stimulant expenses have positive correlation with food insecurity with significance of 1 percent probability level. This shows that household those spend high money for stimulant the high probability to fail in food insecurity. The mean of stimulant expenses was found 3787.66 Brr. The mean of food insecurity household and food secure household were Br 4272.41 and 3032.88 respectively. This implies that food insecure household spends more money than food secure household. The minimum and maximum value of food secure and food insecure household were 1000 and 12000 Birr respectively (Table 5).

Table 5 Socio- economic decomposition of the food insecure and food secure households

Variables	Food insecurity status	N	Mean	Minimum	Maximum	t-value	p-value
Family size	Food insecure	232	5.23	1	9	7.24	0.000
	Food secure	149	4.18				
	<b>Total</b>	<b>381</b>	<b>4.82</b>				
Age the household Head	Food insecure	232	52.48	27	80	-3.01	0.003
	Food secure	149	56.34				
	<b>Total</b>	<b>381</b>	<b>53.99</b>				

Dependency Ratio	Food insecure	232	0.26	0	0.4	8.4	0.000
	Food secure	149	0.17				
	<b>Total</b>	<b>381</b>	<b>2.226</b>				
Cultivated land size	Food insecure	232	0.8	0.25	1.5	-7.29	0.000
	Food secure	149	1.07				
	<b>Total</b>	<b>381</b>	<b>0.9</b>				
Total livestock Unit	Food insecure	232	2.04	0.5	3.5	-8.09	0.000
	Food secure	149	2.63				
	<b>Total</b>	<b>381</b>	<b>2.27</b>				
Total off farm income	Food insecure	232	8658	5000	21000	-4.09	0.000
	Food secure	149	11083				
	<b>Total</b>	<b>381</b>	<b>9606</b>				
Number of ox owned	Food insecure	232	0.95	0	2	-3.22	0.001
	Food secure	149	1.14				
	<b>Total</b>	<b>381</b>	<b>1.03</b>				
Stimulant expense	Food insecure	232	4272.41	1000	12000	3.57	0.000
	Food secure	149	3032.88				
	<b>Total</b>	<b>381</b>	<b>3787.66</b>				
Irrigated land Size	Food insecure	232	0.05	0	0.5	-4.63	0.000
	Food secure	149	0.09				
	<b>Total</b>	<b>381</b>	<b>0.06</b>				

NOTE: significant at 0.01 and 0.05 level of significance

Source; own computation based on survey data 2024

#### **4.2.10. Household Food Insecurity and Education Level of the Household head**

With regard to education level of the household head, the result shows that 164 (70.69 %) of illiterate households were food insecure in the study area. The survey shows that education levels of the household was statistically significant at less than 1% probability level. This shows that illiterate households are more likely food insecure when comparing with literate households (table 6).

#### **4.2.11. Household Food Insecurity and Access to Credit**

Credit for the purpose of consumption or purchase of agricultural inputs like improved seed, chemical fertilizer, etc. improves the food security status of households. The result shows that 85.34% (198) of those not accessible to credit were food insecure in the study area. Credit has significant at less than 1% probability (table 6).

#### **4.2.12. Household Food Insecurity and Sex of the Household head**

Out of 381 household 347 were male headed households. The result shows that 91.81 % of male headed households food insecure whereas 8.19 % female headed households food insecure (table 6). Even though, the survey of the result indicates that there is non-significance result female household head less food insecurity than males, because males more experienced stimulant expense than female and females have saving culture than males. But the chi square test indicates that there is no systematic correlation between food insecurity and sex of the household head.

#### **4.2.13. Household Food Insecurity and Technology Adoption**

Technologies like fertilizer, improved seed, pesticides and herbicides are vital to increase agriculture production and productivity in rural areas. The survey result shows that 135 (58.19 %) of the household does not adopt these technologies are food insecure, and 24 (16.1 %) of the household does not adopt these technologies are food secure 97(41.81%) of the household does adopt these technologies but they are food insecure, whereas 125 (83.9 %) of the household does adopt these technologies are food secure and 24 (16.1 %) of the household does adopt these technologies but they are food insecure. The survey result shows that technology adoption has significant at less than 1% probability level. Hence technology adoption and food insecurity correlated negatively this implies that a household that does not adopt technology have food insecure comparing with technology user household (table 6).

#### 4.2.14. Household Food Insecurity and Credit Interest Acceptance

Credit interest acceptance were one of the factor that affect food insecurity in the study area, the result shows that 85.4% (198) households food insecure do not accepted credit interest. This implies that household that were accepted credit interest have food secure than households that have no accepted credit interest. Credit interest acceptance and household food insecurity have correlation and significant at less than 1% probability level (table 6).

Table 6 Education, Accessibility of Credit, Sex of the Household head, Technology Adoption and Credit Interest Acceptance

Variable	Score	Food insecure		Food secure		Chi-square	
		N	%	No	%	test	p-value
Education status of the household head	Illiterate	164	70.69	76	51	15.07	0.000
	Literate	68	29.31	73	49		
Credit interest acceptance	No	161	69.4	46	30.87	54.268	0.000
	Yes	71	30.6	103	69.13		
Sex of the household Head	Male	213	91.81	134	89.93	0.3935	0.530
	Female	19	8.19	15	10.07		
Technology adoption	No	135	58.19	24	16.1	66.0766	0.000
	Yes	97	41.81	125	83.9		
Access to credit	No	198	85.34	108	72.48	129.7747	0.000
	Yes	34	14.66	41	27.52		

NOTE: \*\*\* significant at 0.000 levels

Source; own computation based on survey data 2024

### **4.3.Determinants of Food Insecurity (Econometric Result)**

In the preceding parts, the descriptive analyses of important explanatory variables, which are expected to have impact on food insecurity status of households, were presented. In this section, the selected explanatory variables were used to estimate the binary logistic regression model and to examine the determinants of household food insecurity. A binary logistic regression model was fitted to estimate the effects of the hypothesized explanatory variables on the probabilities of being food insecure and food secure. Data was subjected STATA 14.2 to undertake the econometrics analysis. Prior to the estimation of the model parameters, it is crucial to look into the problem of multicollinearity or association among the potential candidate variables. To this end, the variance inflation factor (VIF) was used to test the degree of multicollinearity among the continuous variables. The value of VIF greater or equal to 10 is an indicator of a serious multicollinearity problem and it is important to omit such variables from the model. In this analysis, the values of VIF for all continuous variables were found to be less than 10. Thus, there were no serious problems of multicollinearity (appendix 1).

Similarly, the contingency coefficients, which measure the association between various discrete variables based on Chi-square statistics, were computed in order to check the degree of association among the discrete variables. The contingency coefficients range between zero and one, where the value of zero indicates no association between the variables and the value closer to one indicates strong association. As a result, the computation revealed that there was no serious problem of association among discrete explanatory variables. Hence, all the five discrete variables were entered into logistic Analysis (appendix 2). There is no serious problem of Heteroscedicity (appendix 3).

Table 7 Logistic Regression Model

Logistic regression							
FODINS	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
FASZ	.409	.182	2.25	.025	.053	.765	**
AGE	-.005	.017	-0.29	.773	-.038	.028	
DPR	5.928	2.168	2.73	.006	1.679	10.177	***
EDUC	-1.312	.394	-3.33	.001	-2.085	-.54	***
CLSZ	-1.647	.516	-3.19	.001	-2.658	-.636	***
ATC	-2.016	.385	-5.24	0	-2.77	-1.262	***
TLU	-.618	.27	-2.29	.022	-1.148	-.089	**
TOFIN	0	0	-2.27	.023	0	0	**
SHLD	.324	.598	0.54	.588	-.848	1.497	
NOX	-.893	.382	-2.34	.019	-1.642	-.144	**
TEAD	-1.453	.411	-3.53	0	-2.259	-.646	***
STMEX	0	0	2.89	.004	0	0	***
CIA	-.792	.363	-2.18	.029	-1.504	-.079	**
IGLS	-3.599	1.808	-1.99	.047	-7.143	-.055	**
Constant	4.069	1.68	2.42	.015	.778	7.361	**

Mean dependent var	0.609	SD dependent var	0.489
Pseudo r-squared	0.575	Number of obs	381
Chi-square	293.377	Prob > chi2	0.000
Akaike crit. (AIC)	246.574	Bayesian crit. (BIC)	305.716

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

Source: Model output, 2024

We can present the above table in equation forms as follows.

$$Y = 1.505239 - 0.9951683X_1 + 375.2952X_2 - 0.2692565X_3 - 0.1926499X_4 - 0.1331856X_5 - 0.5388514X_6 - 0.9999315X_7 + 1.382983 X_8 - 0.4094597X_9 - 0.2339381X_{10} + 1.000181X_{11} - 0.4531147X_{12} - 0.0273502X_{13} \text{ -----}9$$

Sample household heads were 381 observations included in regression analysis;

The model result in table 7 of the logistic regression model estimate indicates that out of the 14 factors considered in the model, 12 variables were found to be the determining factors of the state of food insecurity with different level of significance. These variables include family size, dependency ratio, education level of the household head, cultivated land size, irrigated land size access to credit, total off farm income, and number of ox owned, total livestock owned, technology adoption, stimulant expenses, and credit interest acceptance. Whereas; the rest 2 of the 14 explanatory variables were found to have no significant influence on food insecurity status of the household (Table 7). In what follows, the effect of the significant explanatory variables on food insecurity status of rural households was discussed.

**Family size (FASZ):** this variable is found to be significant at less than 5% probability level in determining household food insecurity. The result shows that in the study area family size has positive correlation with food insecurity. This indicates that as the family size increases, the number of mouths to be fed obviously increases which shares the available food in the household. Keeping other variables constant the odd ratio of 0.0813951 the probability of being food insecure increases by 8.1% as family size increased by one. The result is consistency with the research finding Ermais G. (2018)

**Dependency ratio (DPR):** This variable is found to be significant at less than 1% probability level in determining the household food insecurity. The result shows that the variable is found positive correlation with food insecurity. This indicates that as the independent family size increases in the household member the probability of food insecure also increase. The odd ratio of 375.2952 implies that, *ceteris paribus*, the probability of being food insecure increases by 3.75% as dependent household increases by one (Table 7). This explains that the higher the number of the non-productive age groups, individuals whose ages are less than 15 years and greater than 65 years, in relation to the number of nonproductive age groups of individual that the household has, the higher the probability of food insecure. This shows that those rural household engage by agriculture and consumes a lot of labor force, with large economically non-active members tend to be food insecure than those with small dependent family size. The result is consistency with the research finding Aschalew F. and Ayalneh B. (2005)

**Education level of the household head (EDUC):** this variable is found to be significance at 1% level of probability. The result shows that variable is found negative association with food insecurity. The negative sign of the odd ratio implies that as the household head literate the probability of food insecure is decrease comparing with illiterate household. This implies that literate farmer are better off than illiterate farmers in terms of using agricultural inputs, technologies, receiving agricultural extension, implement improved practice, literate individuals are very ambitious to get information and use it and are more competent to increase productivity. The result is consistency with the research finding Mebratu N. (2018).

**Cultivated land size (CLSZ):** this variable has significant at 1% probability level. The result shows that negative association with food insecurity. Keeping other variables constant the odd ratio of 0.1926499 increases the probability of food insecure household decrease by 19.26% as cultivated land size one. This indicates that households who have large cultivated land size can

has a better option to diversify production and to increase its production so such a household will be in a better position in its food security status. Where comparing landless household with land owned households landless have food insecure. The result is consistence with the research finding Mebratu N. (2018).

**Irrigated land size (IGLS):** this variable has significant at less than 5% probability level. The result shows that negative association with food insecurity. Keeping other variables constant the odd ratio of .0273502 increases the probability of food insecure household decrease by 2.7 % as irrigated land size one. This indicates that households who have large cultivated land size can has a better option to diversify production and to increase its production so such a household will be in a better position in its food security status. Where comparing irrigated landless household with irrigated land owned, households landless have food insecure. The result is consistence with the research finding Mebratu N. (2018).

**Credit interest acceptance (CIA):** this variable has a negative relationship with food insecurity and has less than 5% a significant level probability. The result shows that variable is found negative association with food insecurity. The negative sign of the odd ratio of 0.1590842 implies that as the household credit interest acceptance have the probability of food insecure is decrease by 15.9 % as comparing with household does not accessible to credit. Those households who are accepted credit interest they receive the credit they want have better possibility to purchase agricultural input (improved seed, fertilizer, etc.) or they purchase livestock for resale after they fat them. This indicates that household that are accepted credit interest were food secure than the household that does not accepted credit interest. The result is consistence with the research finding Aschalew F. and Ayalneh B. (2005).

**Access to credit (ATC):** this variable has a negative relationship with food insecurity and has less than 1% a significant level probability. The result shows that variable is found negative association with food insecurity. The negative sign of the odd ratio implies that as the household accessible to credit have the probability of food insecure is decrease comparing with household does not accessible to credit. Those households who receive the credit they want have better possibility to purchase agricultural input (improved seed, fertilizer, etc.) or they purchase livestock for resale after they fat them. In addition to this credit is important to perform nonagricultural activities to improve the income of the household. This indicates that household that are accessible to credit were food secure than the household that does not accessible to

credit. The result is consistent with the research finding Aschalew F. and Ayalneh B. (2005).

**Total off farm income (TOFIN):** this variable is found to be significant at less than 1% level of probability. The result shows that variable is found negative association with food insecurity. This implies that a household that generate income from off farm have the probability of food insecure were decrease. The result of this study supports the hypothesis that the larger off farm income has negative impact on the probability of being food insecure. This indicates that households that engage in off farm can easily purchase agricultural inputs and technologies, nonfood items and to coping food gaps. The result is consistent with the research finding Ermais G. (2018).

**Total number of livestock owned (TLU):** this variable is found at less than 1% level of probability. The result shows that in the study area number of livestock owned have negative relationship with food insecurity. This implies that a household that have livestock the probability of food insecure were decrease. Keeping other variables constant the odd ratio of 0.53 increases the probability of food insecure household decrease by one. Livestock has important to insure food security in Ethiopia their manure is used for soil fertilizer, used as a sources food, and used as income sources by fattening. This indicates those households that have livestock were less probability of food insecure.

**Number of ox owned (NOX):** this variable is found at less than 1% level of probability. The result shows that in the study area number of ox owned have negative relationship with food insecurity. This implies that a household that have ox have the probability of food insecure were decrease. Keeping other variables constant the odd ratio of 4.09 increases the probability of food insecure household decrease by one. Ox has important to insure food security in Ethiopia by plough cultivated land; manure is also used for soil fertilizer, used as a sources food, and used as income sources by fattening. This indicates those households that have ox were less probability of food insecure.

**Technology adoption (TEAD):** this variable has a negative relationship with food insecurity at less than 1% a significant level probability. The negative sign of the odd ratio implies that as the household adopted agricultural technologies have the probability of food insecure is decrease comparing with household does not adopted agricultural technology. This shows that technology is an important variable to increase agriculture production i.e. agricultural input like fertilizer, improved seed, and agricultural technologies like, tractor and etc. were essential to increase

production. So technology adopter households were less probability of food insecure.

**Stimulant expenses (STMEX):** this variable has positive correlation with food insecurity and has a significant at less than 1% level of probability. It indicates that household spends money for stimulant has the probability of food insecurity increase. The result of this study supports the hypothesis that the larger stimulant expense has positive impact on the probability of being food insecure. The study area is known for spending money on daily especially holidays such as religious festival and other annual festival. This implies that stimulant like chat, sigarates, ganja (local name of the stimulant) were factors that contribute to food insecurity.

#### **4.4. Food Insecurity Coping Strategy**

In the study area the household engages mixed farming system; agriculture was the main source of livelihoods with mainly grown annual crops like: sorghum, teff, maize, chickpea and different types of vegetables and perennial crops like: papaya, avocado, mango, zeituni, sugar cane are produced in the area. The other important sources of income were animal production. Of the different animals cattle's, camel, sheep and goat and donkey are mainly reared in the area. Livestock plays important role by providing manure for the soil, used as a source of nutrition and labor force for plough cultivated land.

Household food insecurity occurs when food is not available, accessible, and stable and utilize in terms of quality, quantity and due to cultural influence of the household. Households at risk of food insecure they plan strategy to minimize the problem. In the study area the household uses different mechanisms in different time during the risk some of them are reducing the number of meal in terms of quality and quantity, buying less expensive food like sorghum and maize, by Migration of household members to other countries that have economically strong, borrowing grain from a neighbor or relatives.

As shown in the model results, the households have been affected by various socioeconomic factors, and it was indicated that 60.89 percent of the sample households have faced food insecurity problem. In order to survive food crises, many households have used different coping strategies. In this section several coping strategies were identified in order to smooth consumption of the households.

The most common practiced coping strategies as a household level during sever food insecurity was reducing number of quantity /quality of food (19.39%). The second coping strategy that was used by food insecure households was relying on less expensive food (18.53%). The other

copying strategies sales of household asset, bought food on credit are relying on food aid, migration of household member and with draw children from school and send to work were 17.24%, %, 5.6% and 1.3% respectively to take food insecure household to prevent food insecurity. (Table 8)

TABLE 8: FOOD INSECURITY COPING STRATEGIES

Coping strategies	food insecure household	Percent
Relying on less expensive foods	43	18.53
Reducing number/quantity of meal eaten	45	19.39
Bought food on credit	13	5.6
Relied on food aid	21	9.05
Withdrawal children from school	3	1.3
Sales HH assets	40	17.24
Migration of HH members	67	28.89

Source; own computation based on survey data 2024

## CHAPTER FIVE

### 5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1. Summary

The study was conducted in eight kebeles (Dana, Goshiwoha, Diraroka, Tilifie, Haro, Abiot fira, Gerado and Merto) of in Amhara Regional State North Wollo zone Habru Woreda. It focuses on rural household who are exposed to food insecurity. The major objective of this study were to asses determinants of household food insecurity in rural areas, so as to provide basic for appropriate food insecurity reduction measures in Habru woreda. To this end, identifying food insecure households, demographic and socio economic characteristics of food insecure and food secure groups of rural household.

Multi-level stages of random sampling procedure were used. At the first stage select food insecure District i.e. Habru District. At the second stage categorize the Kebeles of the Woreda in to strata based on the agro ecology nature of the district i.e. eight of Kebeles out of 39 Kebeles. In the last stage by using simple random sampling 381 households were selected. This study made use of secondary and primary data collected by the researcher through conducted formal and informal survey. The primary data includes basic household information covering household family size, sex of household head, age of the household head, education background, dependency ratio, and etc. A structural interview schedule was employed to gather primary data with help of enumerators. In addition to secondary data was also gathered from different sources such as reports of the district and journals associated with food insecurity. The data were collected, presented and organized in descriptive statics and econometric models. Therefore, the summary of the main result as follows;

To analyze the household food insecurity status of the sample household, socio economic characteristics of the rural household, independent sample test has indicated that there is a significant difference between food insecure and food secure group at less than 1% probability level in terms of dependency ratio, cultivated land size, level of education, access to credit, technology adoption, stimulant expenses and less than 5% probability level in terms of family size, irrigated land size, total livestock unit, total off farm income, number of ox owned, credit interest acceptance.

The result of the binary logistic regression model revealed that out of 14 variables included in the model, 12 explanatory variables found to be significant at less than 5% probability level.

According to, cultivated land size, total off farm income, education level of the household head, total livestock owned, access to credit, number of ox owned and technology adoption found to have negative association with food insecurity of the household and significant at 1% probabilities level. Whereas credit interest acceptance and irrigated land size found to have negative association with food insecurity of the household and significant at less 5% probabilities level. Dependency ratio and stimulant expenses found to have positive correlation with food insecurity of household and significant at less than 1% level of probability. Meanwhile Family size was found to have positive association with household food insecurity and significant at less than 5% probability level.

It has been observed that the determinants factors of food insecurity are wide and complex. Proper understanding of the problem and the characteristics of food insecurity is a key starting point to design policies and strategies to ensure food security.

The most common practiced coping strategies as a household level during sever food insecurity was reducing number of quantity /quality of food (19.39%). The second coping strategy that was used by food insecure households was relying on less expensive food (18.53%).

## **5.2.Conclusion**

Understanding of the problem of food insecurity allows as examining the situation and determinants of food insecurity in Habru District.

The study also held to use binary logistic model for the analysis the determinants of household food insecurity among variables, family size, dependency ratio and stimulant expenses found to have positive correlation with food insecurity of household and significant at 1% level of probability. Regarding the odd ratio holding other variables constant, family size, the number of family increases by 1.5% the probability of food insecure are increase by one, dependency ratio, the number of dependent family increase by 3.75% the probability of food insecure are also increase by one, stimulant expense increase the probability food insecure being increased by one. For sex of household head increase a probability of being food insecure increase in males than female due to stimulant expenses were practiced by males than females as the data analysis. On the other hand, among the variables negatively correlated with probability food insecure are, education level of the household head, cultivated land size irrigated land size, total livestock owned, total off farm income, credit interest acceptance, access to credit, number of ox owned,

and technology adoption, found to have negative association with food insecurity of the household and significant at 1% probabilities level.

Those the negative relationship indicates that the food insecure being decrease with the household literate with illiterate household. The education levels of household decrease the probability of food insecurity increase by one. Those study revealed that illiterate households were more food insecure than literate.

The accessibility of credit of decreases the probability of food insecurity increase by one. Those study revealed that households that have no accessible to credit were more food insecure that accessible to credit.

The number of oxen owned, technology adoption, and cultivated land size all decrease the probability of an increase in food insecurity. Similarly, off-farm income decreases the probability of an increase in food insecurity by one.

The variables that are not significant with food insecurity (in the logit model) were age of household and sex of the household were insignificant variables.

### **5.3.Recommendation**

- Based on the findings of the study the following issues are forwarded as recommendation to improve household food insecurity status of the study area.
- The study found that household education level and household food insecurity have negative relationship. The implication of that providing informal education and training on agriculture production to the farmers should be an important element to improve food insecurity.
- Cultivated land size was expected negative correlation with food insecurity. Those by implemented small scale farming system such as poultry production, bee keeping, animal husbandry and fattening and nonagricultural income generating activities to ensure food insecurity, as well as agricultural inputs and technologies to prevent food insecurity.
- Technology adoption was expected negative correlation with food insecurity. This implies that technology users are food secure than the other. Those agriculture technologies and inputs are vital to increase agricultural production, to prevent food insecurity government should have responsible to find the solution. Hence one of the possibilities to solve the problem the government will be subsidize the cost of inputs to make them more affordable and increase supplies.
- Stimulant expenses were expected positive correlation with food insecurity. This implies

that a household that expenses high money is the probability of falling in food insecurity is higher than the others. Enhance saving culture of the household, creating awareness to reduce unnecessary spending money for stimulants to prevent food insecurity.

- Credit interest acceptance were expected negative relationship with food insecurity. This implies that household that accept credit interest to get loan were food secures comparing to the unaccepted household heads. This indicates that creating credit interest awareness is a curtail task in prevent food insecurity.

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## APPENDICES

### Appendix 1: Variance inflation factor (VIF) of continuous variables vif

Variable	VIF	1/VIF
-----+-----		
DPR	1.93	0.517024
FASZ	1.91	0.524211
NOX	1.31	0.760779
CLSZ	1.29	0.773775
AGE	1.24	0.807481
TLU	1.24	0.809698
IGLS	1.14	0.874430
STMEX	1.10	0.912763
TOFIN	1.04	0.957125
-----+-----		
Mean VIF	1.36	

### Appendix 2: Contingency coefficient value for dummy variables

pwcorr EDUC ATC SHLD STMEX CIA

	EDUC	ATC	SHLD	STMEX	CIA
-----					
EDUC	1.0000				
ATC	0.0837	1.0000			
SHLD	-0.1065	0.0634	1.0000		
STMEX	-0.0548	-0.0476	0.1009	1.0000	
CIA	0.1267	0.2959	0.0272	-0.1189	1.0000

### Appendix 3: test of heteroskedasticity

hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of FODINS

chi2(1) = 1.39

Prob > chi2 = 0.2386

### Appendix 4: Conversion factors used to estimate tropical livestock (TLU) equivalents

<b>Animal category</b>	<b>TLU</b>	<b>Animal category</b>	<b>TLU</b>
Donkey (young)	0.35	Cow and ox	1.00
Calf	0.25	Sheep and goat (young)	0.06
Weaned calf	0.34	Horse	1.10
Camel	1.25	Chicken	0.013
Heifer	0.75	Donkey (adult)	0.70
Sheep and goat (adult)	0.13		

Source: Storck et al. (1991)

Appendix 5: energy contents of various every day food items (KJ = 240 calories)

<b>Food items</b>	<b>KJ/g</b>	<b>Food items</b>	<b>KJ/g</b>
Barely	14	Beef	6.7
Wheat	14.2	Chicken	5.8
Wheat Bread	10	Fish	3.4
Maize	14.6	Eggs	6.3
Sorghum	14.5	Milk	2.9
Millet	13.9	Banana	4.2
Rice	14.6	Lemmon	1.6
Beans and peas	13.9	Mango	2.1
Soy beans	14.7	Orange	1.8
Teff	14.2	Carrot	2.0
Cow pea	11.8	Green papers	1.3
Ground nuts	24.0	Tomatoes	0.9
Sunflower seed	23.9	Cabbage	9.8
Lentil	14	Sugar	16.6
Sweet potato	5.1	Abish	1.6
Adenguare	1.44	Oil	33.83

<b>Food items</b>	<b>Units</b>	<b>Calories</b>
Milk	1 cup	0.37
Tea	1 cup	1
Coffee	1 cup	1
Onion	1 piece	40

Sources: ENI (1968)

Appendix 6: House Hold Survey Questionnaire

**Research on Determinants of Food Insecurity among Rural Household in the Case of Habru Woreda**

**Objective:** The purpose of this questionnaire is to gather information about “Determinants of food insecurity in Habru Woreda” for the partial fulfillment of the Master of Development Economics Studies at Woldia University.

**General Directions:**

1. You are kindly requested to give genuine responses
2. You don't need to write your Name
3. Circle the corresponding number of your choices from the given alternatives
4. Put the numbers you agree with to those questions which are not multiple choices
5. The study is entirely academic and all responses are confidential
6. Feel free to respond

**I want to thank you for your patience and genuine response in advance.**

General Information

Date of Interview-----, Code No-----,

Peasant Association Village, -----

**1. Household roster**

1.1. Name, -----

1.2. Age of the household -----,

1.3. sex of the household head----- ,

1.4. educational level of the household head   literate----- illiterate

1.5. family size -----

1.6. marital status of the household -----

1.7. job -----

**2. Dependency ratio:- family age, less than 15year**

Between 15 and 65 -----above 65-----

**3. .Credit Access**

3.1. During the last 12 months have you taken out a loan of any amount, in cash or in Kind?

Yes =1                      No = 2.

3.2. Why did you want to obtain a loan?

3.3.. In which year/month was it borrowed?

3.4. Is there any part of the loan not paid back? Why?

**4. off farm income**

4.1 Do you or any member of your family have income from off/none farm? 1) Yes 2) No If yes fill the following

S/N	Income source from off/non-farm	Income Owned (ETB )In the last 12 Months
1.	Petty trade	
2.	Construction work	
3.	Forest products sale (like Eucalyptus log)	
4.	In PSNP	
5.	Remittance	
6.	Other(please specify):	
	Total from other HH sources	

❖ If in kind, convert to birr at prices prevailing at the transfer

**5. Cultivated Land size**

5.1 Do you have your own land? (Yes =1 No = 2)

5.2 If your answer is no how do you going to can produce crops?

5.3 If yes, fill the following table

S/N	Type of Land (A)	Land Holding size		Fertility Level 1-low 2. medium 3. high
		Timad (1/4 Ha)	Ha (B)	
1.	non-irrigable) 1) Yes 2 )No			
2.	Irrigable 1) Yes 2 )No			
3.	Grazing Land1) Yes 2 )No			

5.4 What is the total area of land you cultivated last year? timad

5.5 Do you think that your piece of land is enough to support your family?

5.6 If no to question No 5.5 State your reasons

5.7 What proportion of your cultivated land is allotted to?

a) Annual crops\_\_\_\_\_timad

b) Perennials \_\_\_\_\_ timad

## 6 . Technology Adoption

6.1 Do you use chemical fertilizers? Yes = 1, No=2

6.2 .Have you been using fertilizer, improved seed, pesticides and herbicides every year?

Yes = 1 No = 2

6.3 If no to question No 5.2 why?

6.4. If yes to question No 6.2, indicate the amount of fertilizer, improved seed, pesticides and herbicides used in this years

Type of crops	2023	
	Fertilizer used (qt)	Area (Timad)

6.5. Do you use improved seed on your farm? Yes = 1 No = 2

6.6. Do you apply pesticides and herbicides on your corps? Yes = 1 No = 2

6.7. If no to question No 6.6, why?

6.8 Do you use plough tractor on your farm? Yes = 1 No = 2

6.9 If no to question No 6.8, why?

6.10 Do you apply pesticides and herbicides on your crops? Yes = 1 No = 2

6.11 If no to question No 6.10, why?

## 7 Irrigated land size

7.1 Do you use any irrigation scheme? Yes = 1 No = 2

7.2 If yes to questions 7.1 what types of crops did you produce using irrigation?

Type of crops	2023	
	Area (trial)	Production (qt)

7.3 How many kilometers from your nearest market to your home? -----km

## 8. Number of Livestock and number of oxen owned

8.1 Have your own livestock? Yes = 1, No. 2

8.2 If yes, give details

Type Of Livestock	Number owned and present at your farm	Did you sell any of your animals in The past one Years? (Yes=1,No=2) If yes,			How many were slaughtered
		No. Sold if non write 0	Total sales value of all sold	Reason for sale	
1. Number of ox					
2. Cow					
3. Heifer and bull					
4. Sheep and goat					
5. Camel					
6. Donkey					
7. Bee					
8. hen					

8.3 Do you use oxen for your farm operation? (Yes = 1, No = 0)

8.4 If yes to question No 8.3. Are your oxen enough for your farm operations?

(Yes=1, No = 0)

8.5 If you do not have enough oxen, how do you get additional oxen you need?

8.6 Do you have enough feed for your animals? (Yes = 1, No = 0)

8.7 Is animal disease a problem to you? (Yes=1, No=2)

8.8 If yes to question No 8.7, do you get enough drugs to treat your animals (yes = 1, No = 0)

## 9 Stimulant expenses

9.1 Have you expense money for stimulant for the last year? (Yes = 1, No = 0)

9.2 If your answer is yes, amount in Birr \_\_\_\_\_Amount in kind/birr \_

9.3 If your answer is no why?

## 10 . Credit interest acceptance

10.1 During the last 12 months have you accept credit interest awareness to take loan?

Yes =1 no = 2.

10.2 If your answer is no why?

## 11 Income from agriculture and off farm

Would you please state how much the household has earned monthly from the following income sources (in 2023)

Source of income	Unit	Quantity	Total sales (Birr)	Time of sale (Name of the months)
Crop sales				
Vegetables				
Fruit				
Animals				
Off farm				
Forest/tree				
Total income				

## 12 Expenditure and expenses

12.1 Indicate the type and amount of expenditures of your family for the last year

Type of expenditure	Amount (Birr)
1. Food item expenditure	
2. Nonfood expenditure	
3 Stimulant expenses	
Total Expenditures	

### 13 Food insecurity coping strategies

13.1 Have you any occupations to food insecurity season last 12 month in your home 1) yes 2) No

13.2 Have you or any of your household members experienced any coping strategies in the case of food insecurity season? 1) Yes 2) No

13.3 If yes the above questions ; in the past 12 Months, how frequently did your household resort to using one or more of the following strategies in order to access food? Codes:

- 0 = Never,
- 1 = Seldom,
- 2 = Sometimes (1-2days a week),
- 3 = Often (3-6 days a week)
- 4 = Daily

S/N	Copying strategies	0	1	2	3	4
1	Relying on less expensive foods					
2	Reducing number/quantity of meals eaten					
3	Bought food on credit					
4	Relied on food aid					
5	Withdrawal children from school and send to work					
6	Sales HH assets					
7	Migration of HH members					
9	If others (Specify )					