Determinants of Household Food Insecurity among Pastoral and Agro Pastoral Communities in Ethiopia: Evidence From Afar Region (Awsa zone)

A Thesis Submitted To the School of Graduate Studies of Jimma University as Partial Fulfillment for the Award of the Degree of Masters of Science in Development Economics

JIMMA UNIVERSITY
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Determinants of Household Food Insecurity among Pastoral and Agro Pastoral Communities in Ethiopia: Evidence From Afar Region (Awsa zone)

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DECLARATION

I hereby declare that this thesis entitled "Determinants of Household Food Insecurity among Pastoral and Agro Pastoral Communities in Ethiopia: Evidence From Afar Region (Awsa zone)" has been Carried out by me under the guidance and supervision of Leta Sera (Ph.D) and Mr. Negese Tamirat

The thesis is original and not submitted to any other institutions anywhere for the award of any academic degree, diploma, or certificate.

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Date:_____

CERTIFICATE

This is to certify that the thesis entitled "Determinants of Household Food Insecurity among Pastoral and Agro Pastoral Communities in Ethiopia: Evidence From Afar Region (Awsa zone)" Submitted to Jimma University for the award of the Degree of Master of Development Economics and is a record of Valuable research work carried out by Idris Hussein, under our guidance and supervision.

Therefore we hereby declare that no part of this thesis has been submitted to any other university or institutions for the award of any degree of diploma.

Main Advisor's Name	Date	signature
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As members of the Examining Board of the Final MSc. Thesis virtual Presentation, we certify that we have read and evaluated the Thesis prepared by Idris Hussein entitled "Determinants of Household Food Insecurity among Pastoral and Agro Pastoral Communities in Ethiopia: Evidence From Afar Region (Awsa zone)" and recommend that the Thesis is accepted as fulfilling the thesis requirement for the degree of Master of Science in Development Economics.

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Abstract

This study attempts to estimate the food insecurity status and identify the major determinants of food insecurity in pastoral and agro pastoral household in awsa zone, afar region: Ethiopia. Multi stage sampling technique was used to select representative sample households and Survey data were collected from 200 sample household heads. The study used both primary and secondary data sources. Primary data was collected through structured questionnaire and focus group discussion while Secondary data was collected from reviewing of various documents related to food insecurity. Descriptive statistics, foster gear Thorbecke (FGT) indices and binary logistic econometrics model was used to analyze the collected data. It was found that about 62 percent of the sampled households were food insecure and 38 percent were food secure. The FGT indices revealed that the incidence, depth and severity of food insecurity are found to be 62 percent, 18 percent and, 7.16 percent respectively. The results of the regression analysis showed sex(male) of household head, marital status(married) of the household head, literacy of household head, livestock holding, cultivated land size and food aid were negatively associated with household food insecurity while, family size per adult equivalent positively affecting household food insecurity. The most severe coping strategies employed by households during food deficit were dropping children out of school, sale of fire wood, wood for construction and charcoal, selling long lasting household assets, slaughtering small animals for household consumption and exchange of small animals to cereals. Generally the findings of the study suggests that there is a need to improve their educational level by bringing education intervention programs and to improve livestock production and productivity through provision of veterinary drug services, sustainable forage development programs, improving the capacity of community animal health workers and a need to Provide aids (food or in kind) in a way that could be assisted households to fully stand on their own. Moreover, it is recommended that the Government together with its development partners have to plan and implement a long term and sustainable solutions and design welfare monitoring system for the pastoral and agro pastoral community in order to reduce the existing high level of food insecurity and to reduce households dependency on food aid grants.

Key words: Food Insecurity, Foster Gear Thorbecke, Food Aid, Pastoral/Agro Pastoral, Awsa Zone

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ACRONYMS or ABREVIATIONS

AE	Adult Equivalent
ANRS	Afar National Regional State
APARDB	Afar Pastoral, Agro-pastoral and Rural Development Bureau
CAADP	Comprehensive Africa Agriculture Development
CARE	Cooperative for Assistance and Relief Everywhere
CSA	Central Statistics Agency
CSI	Coping Strategies Index
ECA	Economic Commission for Africa
EDHS	Ethiopian demographic and health survey
EDRI	Ethiopian Development Research Institute
FAO	Food and Agricultural Organization
FGT	Food Insecurity, Foster Gear Thorbecke
FSNIS	Food Security and Nutrition Information System
GHI	Global Hunger Index
HICE	Household Income and Expenditure Survey
HPG	Human Policy Group
IFAD	International Fund for Agricultural Development
IIRR	International Institute for Rural Reconstruction
IOD	Indian Ocean Dipole
MDG	Millennium Development Goal
MOARD	Ministry Of Agriculture and Rural Development
MoFED	Ministry of Finance and Economic Development

NCFSE	New Coalition on Food Security in Ethiopia
NMA	National Meteorology Agency
PFE	Pastoral Forum Ethiopia
PSNP	Productive Safety Net Programme
SD	Standard Deviation
SPIDA	Social Protection for Inclusive Development in Afar
TLU	Tropical Livestock Unit
UNDP	United Nation Development Program
UNICEF	United Nations International Children's Emergency Fund
USDA	United States Department of Agriculture
WFP	World Food Program
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1.   Background of the study

Food insecurity is an issue of both developed and less developed countries in the world; but the highest proportions of undernourished people are living in sub-Saharan Africa. Based on FAO report (2019) these days over 820 million peoples are experiencing hungry at the global level. From these the biggest proportion around 257 million or nearly 31% are from Africa. From whom around 237 million undernourished people are from sub-Saharan Africa and the remaining 20 million people are in Northern Africa. Compared to 2015 there are 34.5 million more undernourished people in Africa. Of those 32.6 million is in sub-Saharan Africa, and 1.9 million more in Northern Africa. Nearly half of the increase is due to the rise in undernourished people in Western Africa, where as another one-third is from Eastern Africa (FAO and ECA, 2018).

Another distressing fact that in 2019, there are more than two billion individuals suffering by moderate and severe food insecurity with in the world. These individuals are experiencing greater risk of undernourishment and deprived health due to lack of regular access to nutritious and sufficient food. Food insecurity is primary concentrated in middle and low income countries. The peoples living in low income countries experience high, moderate and severe food insecurity than high income countries, only 8 percent of the total population of northern America and Europe are food insecure. The prevalence rate of food insecurity is higher among women than men in the world (FAO; IFAD; UNICEF; WFP and WHO, 2019).

Ethiopia is one of the least developed countries in Africa that has made incredible progress in the last few decades in reducing poverty and increasing food production (Kopf, 2017). However with the increase of over 150% of its population since the 1980s, these gains have not been able to satisfy the rising demand. The country has reduced the proportion of people living below the poverty line, significantly reduced the prevalence of hunger and undernourishment, and expanded access to basic services. However, poverty and food insecurity are still widespread, and millions of

Ethiopians are poor and inadequately fed; a very large number of peoples are outright hungry and on welfare assistance (WFP and CSA, 2019).

According to WFP (2019) in Ethiopia there is 25.5 percent of the total population or approximately 26 million people experience low and very low food security. The number of food insecure could have been much higher unless the food aid had not been provided to around 18 million people through emergency food assistance and productive safety net programme. At regional level the highest proportion of food insecure households is from Amhara Region around 36 percent, followed by Afar and Tigray regions 26.1 percent and 24.7 percent respectively. Food insecurity is higher in rural than urban areas of Ethiopia, nearly 22.7 percent of rural households and 13.9 percent of urban households are food insecure (WFP, 2019).

Several factors contribute to the worsening situation of food insecurity in Ethiopia. According to Birara et al. (2015) population pressure, drought, shortage of farm land, lack of oxen, deterioration of food production capacity, outbreak of plant and animal disease, poor soil fertility, frost attack, shortage of cash income, poor farming technology, poor extension service high labour westage, poor social and infrastructural facility, pre and post harvest crop loss are among factors that affect food insecurity in Ethiopia.

According to WFP (2019), Food insecurity is significantly well higher in pastoral and agro-pastoralist areas of Ethiopia. A Somali and Afar region has the highest number of affected households with in the poorest quintiles. On the other hand, Addis Ababa, Harari, Tigray, and Dire Dawa, have the low proportion of households with in the poorest quintile of wealth index. Droughts and related disasters such as crop failure, water shortage, and livestock disease, land degradation, limited household assets, low income are significant triggers that increase vulnerability to food insecurity and undermined livelihoods in pastoral areas. Climate related shocks also have an effect on productivity, hamper economic progress, and exacerbate existing social and economic problems.

The Afar regional state is located at the northeastern part of Ethiopia and is one of the poorest and least developed of the country's nine regions. It is also a major pastoralist region in the country. It has an estimated population of about 1.8 million people, making up only 1.9 per cent of the Ethiopian population. Apart from a small

percentage of the population engaged in commerce or civil service in urban areas, over 90 percent of the region's population is classified as pastoralists or agro-pastoralists, dependent on animal husbandry for their livelihood. Other income generating activities in the region include crops, cotton and honey production. In recent times, the number of agro-pastoralists has been increasing due to the development of irrigation infrastructures in the region (UNICEF, 2018).

Afar region is one of neglected regions by national development efforts. It is only in recent years that some efforts have been undertaken to provide basic infrastructure such as road accessibility and administrative buildings as well as education and basic health services for each of the woredas. Beside the livestock and other resources, Afar has significant geographical importance a location between the highlands and the two Red Sea (Piguet, 2002).

Food insecurity is much more wide spread and severe among pastoral and agro pastoral households in the region due to frequent drought, harsh climate and of the population is pastoralist and agro pastoralists, the economy of the people more depends livestock production. Pastoralism is extensively practiced and the main livelihood of peoples in the region. According to (Tassew, 2012) the poverty level of afar region is 35% in rural and 30 percent in urban areas of the region. Consequently the widespread, acute and chronic food insecurity and the malnutrition is directly or indirectly associated with chronic poverty, poor infrastructure, ecological constraints, limited arable land, absence of irrigation, disease, poor water and sanitation, inadequate nutritional and health knowledge and ethnic conflicts in the region.

1.2. Statement of the problem

The lowland and pastoral Regions of Ethiopia have repeatedly been seriously affected by drought. They remain vulnerable areas with regard to food security. A number of factors that contribute to the rise of vulnerability of pastoralist communities to food insecurity and poverty are perennial drought, poor infrastructure and poor road communication networks, lack of good governance, internal conflicts, encroachment of agriculture on grazing lands, limited market integration, limited access to education and often unsuitable curriculum, limited political influence of pastoral communities, Poor understanding of pastoralist ways of life, and limited alternative production systems and income (IIR, 2004).

The Afar pastoralists and agro pastoralists are known for living in environment with a harsh climate in the Horn of Africa. Their traditional mobile livelihood system with strong informal social network enabled them to live and survive their life in such harsh environment for centuries. In addition it enabled them to deal with natural and manmade disasters. But now a day's their traditional informal social networks and resilience to shocks have greatly been challenged by frequent droughts, related with the recent El Niño effect, making them very vulnerable (INCLUDE, 2018).

Poverty is pervasive in the Afar region and higher than the national average. Based on the 2016 Household Income, Consumption and Expenditure (HICE) Survey of the Central Statistical Agency (CSA) about 23.6 per cent of the populations in the region were below the nationally defined poverty line compared to 23.5 per cent for the entire country. Poverty in the rural areas of Afar is more prevalent (26.5 per cent) than in the urban areas (10.6 per cent). Similarly the report produced by INCLUDE (2016) compared to the national and Afar regional state figures of 2015/16, which are 23.5% and 23.6%, respectively, there is a high incidence of poverty (47.6%) and alarming income inequality ratio of 0.592 within the sampled districts in the Afar region.

There is a higher incidence of food poverty among the pastoral communities than the agro-pastoral communities, and PSNP non-participant households have a higher number or head count index than their counterparts. The food insecurity situation in the region is also critical. The highest proportion of people living in food poverty in Ethiopia 28.3 percent is in afar region in 2016. According to EDHS (2016), the

childhood malnutrition (stunting) in the region is among the highest 41 percent in afar region compared to 38 per cent in the country.

The Ethiopian government identified Afar region as one of four developing regional States because of high poverty prevalence and social indicators lagging significantly compared to national averages. Poor Infrastructure and insufficient capacity for mana gement and implementation, increasing environmental degradation, vulnerability to drought and floding and exacerbating climate change are major development challenges interacting with other factors to cause disease outbreaks, pressure and conflicts over resources such as water and grazing land. There are both recurrent and prolonged emergency situations in Afar region (UNICEF, 2018). However, the regional government in collaboration with central government, NGOs, donor agencies and other development partners has made some efforts to reduce poverty in general and combating hunger and vulnerability of food insecurity in particular so as to improve the livelihood of pastoral and agro pastoral communities. But it failed to strengthen the livelihoods and resilience of vulnerable households and food security has not achieved yet (SPIDA, 2018).

A lot of research work has been carried out on food insecurity in general and determinants of food insecurity in particular in Ethiopia, with a focus on farmers that practice mixed farming in the highland and central part of the country, but the lowland pastoral and agro pastoral areas which constitute a large size of the country's land have not been very well addressed. So, there are some gaps and failings in literature. The harsh Afar environment, together with a lack of resources and limited local research capacity, have discouraged researchers and made it difficult to conduct systematic research work in the region. Since food security policies and intervention requires empirical evidence this study intends to address these gaps in the literature through an in-depth investigation of the current food insecurity situation in the pastoral and agro-pastoral communities of Afar Region. The study will examine the status and identify the socio-economic and institutional factors that are associated with household food insecurity in the study area.

1.3. Objectives of the study

1.3.1. General objective

The general objective of the study is to identify the major determinants of household food insecurity among pastoral and agro pastoral communities of afar region (Awsa zone), Ethiopia

1.3.2. Specific objectives

The specific objectives are as follows

1. To investigate the food insecurity status in the study area
2. To measure the food insecurity gap and its severity among households in the study area
3. To identify the major determinants of household food insecurity in the study area
4. To identify the major strategies adopted by the households to cope with food insecurity in the study area.

1.4. Significance of the study

This study intends to assess the food insecurity situation in pastoral and agro pastoral households in awsa zone, Afar region with a focus on investigating food insecurity status, measuring its severity, indentifying the determinants factors and coping mechanisms of food insecurity. However it is expected to give clear understanding of the factors determining food insecurity among the pastoral and agro pastoral households in afar region. It will provide golden opportunities for policy makers and planners in the formulation of appropriate policies that ensure food security and to design new interventions in order to improve the well being and livelihoods of the communities. In addition the study is expected to fill the literature gap on food insecurity situation in pastoral and agro pastoral community and complements the researches done up to date on food insecurity in Ethiopia.

1.5. Scope and Limitation of the study

This study investigates the determinants of household food insecurity among pastoral and agro pastoral households in awsa zone; Afar region, Ethiopia. The study covers two districts (Aysaita and Dubti) and six kebeles three from each districts from which a total of 200 sample households selected. Due to constraints arising from poor infrastructure, security problems, harsh climatic conditions and other logistics related

problems, the researcher couldn't cover all districts of Awsa zone. However, recommendations and policy implications drawn out of this study could be used in other locations in awsa zone of Afar national regional state.

1.6. Organization of the study

The study is organized into five chapters with different sub topics. The second chapter contains the reviews of the related literatures. In these chapter conceptual definitions, theoretical literatures which were previously proposed by different scholars and the empirical literatures of different studies are also justified. The third chapter is a methodology part which contains the brief description of the study area, the perspective sample woredas, the sampling methods employed and statistical and econometric tools used in data collation, sampling determination and data analysis. The obtained results are discussed in the fourth chapter and the fifth chapter presents the summary, conclusion and recommendation of the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURES

2.1. Theoretical Literature

2.1.1. Definitions and Concepts of Food Insecurity

Food insecurity is a dynamic concept, which has new dimensions incorporated continuously and levels of evaluation through the years. This proceeding evaluation of food security concept reflects the broader recognition of the complexities of the concepts in studies and public policy, because the issue of food security has long history beginning from time when world food crisis happen in the early 1970s (clay, 2002). But at the time of global food crises (in the first half of 1970's) the idea of food security mainly focused on the physical existence of food and the stability of food prices, because there was an extreme instability of prices in the agricultural commodity market and disorders in the currency and energy markets at that time (Berry et al., 2015)

The definition of food security that recognize the serious needs and behavior of potentially vulnerable and affected individuals is considered necessary due to the incidence of famine, hunger and food crises in the global level (Shaw, 2007). There are around two hundred definitions and more than 450 indicators of food security. It is impossible to measure food security directly due to its complexity notion, but different proxy measures have been recommended.. The most commonly used measures of food security are Consumption and expenditure, nutritional status, coping strategies (clay, 2002).

Food and Agriculture Organization (FAO) provided the current broadly accepted definition on its annual report on global food security "The State of Food Insecurity in the World 2001" "Food security is a condition exists when peoples are able to have physical, economic and social access to adequate and nutritious food that meets their energy needs and food preferences to live healthy and active life" (FAO, 2002). The fourth dimension stability was added when last revision to this definition at world summit on food security takes place in 2009 as an indicator of short term period of the

flexibility of food systems to resist shocks, whether natural or man-made (FAO, 2009).

Food security is defined by different institutions, organizations and individual researchers in several ways s without much amendment in the basic concepts. According to FAO (2008) food security is defined as a situation that achieved at the individual, household, national, regional and global levels when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2008). This definition has widely recognized the four pillars of food security: availability, accessibility, utilization and stability. On the other hand, Hussein and Janekarnkij (2013) in their recent studies defined food security as, the sufficient availability and access to food for households in order to meet the minimum energy requirements as suggested for an active and healthy life.

2.1.1.1.   Dimensions of food security

Four dimensions of food security have been identified based on FAO (2008) definition; which are food availability, food accessibility, food utilization and stability.

Food availability: refers to the physical existence of food at global, national, household and individual level with the appropriate quantities and qualities from domestic food production, commercial food imports, commercial food exports, food aid and domestic food stocks (Gregory et al., 2005; Anderson et al., 2015). In order to asses food availability the factors that should be analyzed are sufficiency of dietary energy available, share of calories derived from cereals, roots and tubers, average protein supply, and average value of produced food (Anderson et al., 2015).

Food access: access refers to the capability to attain adequate food with assured quality and quantity to meet up nutritional requirements of all household members. Here the food should be attained at right place and right time and also people should have an ability to purchase adequate and nutritious food. Access of food mainly relied on income available to the household, the distribution of income within the household, the price of food in the market and other factors worth mentioning are individual's access to the market, social and institutional rights. (Jrad et al., 2010; Kuwornu, 2011)

Food utilization: utilization refers to the nutritional benefits derived from food consumption which is related to proper food processing, food storage techniques, enough knowledge about nutrition, existence of adequate health and sanitation services. Hence food utilization is largely related to proper biological use of food requiring a diet that contains sufficient energy and essential nutrients as well as adequate knowledge of food storage, food processing, child care and illness management (Jrad et al. 2010; Anderson et al. 2015).

Stability: refers to the stability of all the above mentioned dimensions of food security over time. Even if the food intake is adequate for one day, an individual is still considered to be food insecure. Having inadequate access to food on a periodic basis is risking a deterioration of their nutritional status. Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) have an impact on food security status (FAO, 2008). To ensure food security an individual, household and population, must have food access to at all times. They should not be at risk of losing access to food as consequence of a shock (economically or climatic crises), or cyclically (during particular period of the year, seasonal food insecurity) the concept of stability can therefore refer both the availability and access dimensions of food security (Jrad et al. 2010).

On the other hand Food insecurity defined as a situation which occurs at individuals, households or nation level that has neither physical nor economical access to the nourishment they need. An individual or household is said to be food insecure when its consumption falls to less than 80 percent of the daily minimum suggested amount of calorie intake for an individual to be energetic and healthy. Food insecurity particularly includes small food intake, variable access to food, and vulnerability livelihood strategy that produces adequate food in good times but is not resilient against shocks. These outcomes broadly associate to chronic, cyclical or seasonal, and transitory food insecurity, and all are common in Ethiopia (Devereux, 2000)

Chronic food insecurity: - it is long term or persistent type of food insecurity happens when people are incapable to have their minimum food requirements continuously over time and it is the consequences extensive periods of poverty, shortage of assets and not enough access to productive or financial resources. And it can be alleviate through long term development efforts to address poverty, such as

education or access to productive resources, like credit. It may also require more straight access to food to allow them to increase their productive capacity (FAO, 2005; Hart, 2009).

Transitory food insecurity: is short term and temporary occurs at the time of unexpected fall in the ability to generate or access adequate food in order to provide a good nutritional status and transitory food insecurity is result of short term shocks and variability in food availability and food access, variations in local food production from year to year and fluctuations in food prices and household incomes. Most of the time transitory food insecurity is unpredictable and can emerge suddenly. This makes planning and intervention more difficult and neads different capacities and types of program intervention, including early warning capacity and safety net programmes (Barrett and Sahn, 2001, Hart 2009),

Seasonal food insecurity: falls between chronic and transitory food insecurity. Mostly it is similar to chronic food insecurity as it is usually predictable and follows a sequence of known events. However, seasonal food insecurity with limited duration can be seen as recurrent transitory food insecurity. Seasonal food insecurity exists in a time when cyclical pattern of insufficient access and availability to food. This is associated with seasonal fluctuations in the climate, cropping patterns, work opportunities, labour demand and disease (Devereux, 2008)

2.1.2. Measurements and indicators of food insecurity

Food insecurity is measured in various ways at aggregate and individual level with different purpose. There are three distinct levels including, national, household and individual levels of measurements often practiced in a given country. The measurement at national level is relatively more aggregated and mainly focuses on the food availability. At household level, the measurement takes different forms including food access and nutrition indicators. Some of these indicators show past food stresses that do not serve as an instrument for current interventions. Nutritional outcome, for example, is the consequence of both inadequate food intake and poor absorption of food caused by environmental factors such as diseases and lack of health care. As described by Maxwell et.al. (2008a) the indicators potentially measure food insecurity which frequently available and utilized are: nutritional status of households, actual food consumption at the household level by a 24- hour recall, coping strategies index,

as well as proxy indicators such as calorie intake, household income, productive assets, food shortage, under 5 nutritional status, dietary diversity, and household food insecurity access scale. Although these indicators reasonably capture and designate a small portion of the problem, they do not provide comprehensive picture. According to (Bouis, 1993) the measures that rotate around consumption of food is the most usual indictors of food of food insecurity. As Chung et al., (1997) notes that measure food consumption appropriately the relevant data should be collected on household food consumption, family size, age and sex of individuals, as well as physical size and activity levels. Even if average size and activity levels are presumed, consumption measures capture only the physiological sufficiency elements of food security. In order to avoid the problems on the representativeness of consumption measures, when the study particularly relayed on cross sectional data measuring calorie intake or the sufficiency of household food availability over time continues to be recommended as the main 'benchmark' measures for food security.

Income or consumption has been traditionally used as measures of material deprivation. Consumption method is typically preferred over income as the consumption better captures long run welfare. Consumption may also better reflect household's ability to meet their basic needs. Income is one of the factors that enable consumption, though consumption also reflects a household's access to credit and saving at times when their income is too low. Hence, consumption is a better measure of a household's welfare than income. Moreover, in a developing country setting, households are likely to underreport their income level more than they do with their consumption (Nicholas et al, 2006).

Hoddinott (1999) mentioned four ways of measuring food security at household and individual level: individual intakes (measured either directly or 24-hour recall period), household caloric acquisition, dietary diversity, and household coping strategy indices. This ordering of methods is purposeful, moving from methods that are more accurate but regarded as very time and skill intensive to those that can be implemented easily, are relatively not demanding in terms of the skills required by the implementers, but are more impressionistic (Maxwell, 1996).

Individual intake: This is to undertake 24-hour recalls of food consumption for individual members of a household, and analyze each type of food mentioned for

caloric content (and sometimes a more complete nutrient analysis). While this method results in more reliable consumption data and captures intra-household distributional differences, it is subject to a number of drawbacks: memory lapses, observer bias, respondent fatigue, a short and possibly unrepresentative recall period and such high data collection costs those resources often constrain analysis to relatively small samples (Bouis, 1993).

Dietary diversity: One or more persons within the household are asked about different items they have consumed in a specified period. Where it is suspected that there may be differences in food consumption among household members, these questions can be asked of different household members. Calculating a simple sum of the number of different foods eaten by that person over the specified period of time or calculating a weighted sum where the weights reflect the frequency of consumption are used. The disadvantage of this measure is that simple form does not record quantities. If it is not possible to ask about frequency of consumption of particular quantities, it become impossible to estimate the amount to which diets are inadequate in terms of caloric availability (Maxwell et.al 2002)

Household caloric acquisition: Here the person responsible for preparing meals is asked how much food was prepared for consumption over a period of time. The most knowledgeable person in the household is asked a set of questions regarding food prepared for meals over specific period of time usually 7 or 14 days. It requires listing out food types on questionnaire and distinguishing unambiguously between the amounts of food purchased, prepared for consumption and the amount food served. This measure produces a crude estimate of number of calories available for consumption in the household. Because the questions are retrospective rather than prospective, the possibility that individuals will change their behaviour as a consequence of being observed is lessened. The level of skill required by enumerators is less than that needed to obtain information on individual intakes.

Coping strategies index: this is a simple method and requires less resource and time. It does not require skilled man power and can be handled by rapid appraisal techniques. The index is derived from household coping strategies and enables researchers to capture the state of vulnerability of food insecurity. The core technique is to organize and synthesize the information in to a comparable figure. It allows use

of a single or a combination of many coping strategies to delineate secure and insecure households. The method may be applied in many ways, depending on the level of accuracy required and the type of data available (Hoddinott, 1999). According to the study of Maxwell et al, (2002) some disadvantages of these measures are: as it is a subjective measure, different people have different ideas as to what is meant by "eating smaller portions" comparison across households or a locality is problematic. However, the four types of food security measurement mentioned above only household caloric acquisition method can capture but the other methods cannot capture consumption of particular quantities and as a result it is not possible to estimate kilocalorie consumption per household.

2.1.3. Pastoral and agro pastoral livelihood

Livelihoods are a means of making a living. They comprise ways in which people access and mobilize resources which enable them to pursue goals necessary for their survival and long-term well-being. Livelihoods are affected by natural, policy, social, economic, physical, and human factors (Beruk, 2003).

Pastoralism is a method of utilizing agriculture depending upon widespread herding where movements of herds and men are the major components of the system (PFE, 2012). It is also a specialized form of natural resource management, adapted to ecosystems defined as marginal, characterised by a limited, variable and unpredictable agro-ecological resource endowment. So as to utilize these environment pastoralists fundamentally depends upon mobile livestock rearing; this is the factor that distinguishes them from other rural communities. Pastoralism is hence not just only relying on economic activity with the aim of animal production but also it is a livelihood systems and a lifestyle of pastoralists (Mohammed, 2015).

As a way of life and economic activity, pastoralism in Africa is one of the oldest, most resilient and most adaptive livelihoods strategies which are well suited to arid and semi-arid environments. Although there is no standard definition of pastoralism, it is often defined as a livelihood in which at least 50 per cent of a household's food income is derived from livestock. Furthermore pastoralism is characterized by mobility and in particular, the seasonal movement of livestock to access grazing resources and water. They have developed a diverse range of strategies, institutions and networks to exploit the unpredictability of arid environments to their

economic advantage. Mobility of livestock and its breading needs control carefully in order to feed best quality pastures selectively in dispersed time and space and more critical strategies that allow them to create economic value rather than mere survival in difficult environments are required (CAADP, 2009). In the literature, "pastoral system" is often used as an alternative term for "pastoralism." A pastoral system is defined as a system occurring in rangeland areas, where livestock grazing is the predominant form of land use (FAO, 2002). Pastoralism is an adaptive system in particular aspects of natural, political, social and economic environments. In a pastoral system people who herd or raise livestock are called "pastoralists," and they currently live in more than 100 countries (FAO, 2008).

Pastoral systems support the lives of the millions of people who are located in harsh environments where alternative land use systems are highly uncertain or simply not possible. Livestock based pastoral systems significantly contribute to national and regional economies and provide important environmental services such as carbon sequestration, and biodiversity conservation. Extensive pastoral production is practiced on 25% of the global land area, from the dry lands of Africa (66% of the total continent land area) and the Arabian Peninsula, to the highlands of Asia and Latin America1. It provides 10% of the world's meat production, and supports some 200 million pastoral households who raise nearly 1 billion head of camel, cattle and smaller livestock, about a third of which are found in sub-Saharan Africa (FAO, 2001).

A second major livelihood system is agro pastoralism. Again there is no standard definition of agro pastoralism but it involves less reliance on livestock and more reliance on livestock. It occurs in areas with relatively higher rainfall but also involves some forms seasonal movement of livestock to grazing areas The distinction between pastoralism and agro-pastoralism is often blurred because depending on rainfall other trends; households may adopt either of these two livelihood strategies in different years (CAADP, 2009).

Pastoralism remains the main livelihood option in providing food, income and employment opportunities for the communities in these challenging territories. They bring benefit not only to pastoral communities, but also to those living in farming

areas, urban centres and coastal regions, all of whom profit from regional trade and from the value chains of livestock products (IFAD, 2018).

Ethiopia's more than 12 million pastoralist communities comprise roughly 12% to15% of the population occupying 63 percent of the total land mass with more than 29 nationalities and ethnic groups. Most reside in the lowland areas of Afar and Somali regions, with smaller numbers in Oromia and Southern nation and nationality regions. Around 93% are pastoral/agro pastoral and the remaining 7% depend on other agricultural activities like hunting, petty trade, and mining (PFE, 2012). Nevertheless, it is widely recognized that this important part of society had been marginalized throughout the past. In addition to limited access to schools, hospitals or political decision making processes, pastoralists are suffering because of recent developments in climate change and ongoing insecurity in the border regions (PFE, 2017).

The pastoral system in Ethiopia is vulnerable to environmental degradation and food insecurity. Livelihood of pastoralist communities in Ethiopia is constrained by diverse natural, social and economic problems including recurrent drought, lack of basic infrastructure, conflict, and they have low resilient capacities to cope with and recover from such vulnerable situations. The large majorities' livelihoods in most seasons of the year are depending on food assistance of the government (Bruk, 2003).

2.1.4. Food insecurity situation in Ethiopia

Ethiopia is the second largest populous country in Africa next to Nigeria with a projected population of 102.4 million in 2016 (World Bank, 2018). In 2000, 55.3 percent of the total population of Ethiopia was living below the international poverty line of $1.90 PPP per day which was the highest poverty rate in the world, and 44.2 percent of their populations were living below the national poverty line. By 2011, 33.5 percent lived on less than the international poverty line and 29.6 percent of the population was counted as poor by national measures (World Bank, 2015). In 2016, the percentage of population below the national poverty line fell to 23.5 percent (NPC, 2016). even though Ethiopia still faces high levels of food insecurity, ranking as one of the hungriest countries in the world, the Global Hunger Index (GHI) score has declined from 55.9 (extremely alarming) in 2000 to 29.1 (serious) in 2018 (Global Hunger Index, 2018).

In Ethiopia Food insecurity situation is highly associated with severe, persistent food shortage and frequent famine, which are related to repeated drought. In Ethiopian context there is a growing consensus that food insecurity and poverty problems are closely linked. Drought and related problems such as crop failure, shortage of water, and livestock disease, land degradation, limited household assets, low income are significant triggers that increase vulnerability to food insecurity and undermine the livelihood systems (MoARD, 2009).

The 2015 El Niño drought was one of the strongest droughts that have been recorded in Ethiopian history, as a result over 27 million people become food insecure and there were 18.1 million people that require food assistance in 2016. Crop loss reached 50 to 90 percent in some regions due to the 2015/16 El Niño-induced massive drought. Many households lost productive assets, including livestock. While better rains during June to September 2016 brought some relief in crop dominant areas, livestock death continued in pastoralist areas due to the Indian Ocean Dipole (IOD) related drought in late 2016 (Catley et al. 2016). Particularly the pastoral and agro pastoral regions, Afar, Somali and Oromia had been predominantly hard hit by the phenomena. Where water sources had dried up and pastoralists could no longer fed pasture for their animals. The loss of animals, a source of milk and protein, had a negative effect on the nutritional status of children (EC, 2016).

According to (FSNIS, 2019) In Ethiopia, despite major improvements in southern pastoral areas in late 2017 and early 2018, the country still faced a major food security emergency in 2018 with 8 million people in need of food assistance. This was driven by several inter-related factors: the aftermath of three preceding years of poor rainfall, inter communal conflict driving mass displacement, currency devaluation, high food prices, localized floods and dry spells.

Ethiopia has 33 percent of its population food insecure in 2019 and is projected to have only 7 percent of its population projected to be food insecure in 2029. Ethiopia is also projected to decrease its per capita food gap by over 30 percent by 2029, significantly reducing both the intensity of food security and its prevalence. In 2018, Ethiopia's cereal production recovered from the drought reduced levels of 2017, but the lingering effects of the drought still affected livestock production to some extent (FSIN, 2019). Real per capita income in Ethiopia is projected to increase at an annual

rate of 4.7 percent between 2019 and 2029, the highest projected rate of income growth in the East African sub region (USDA, 2019).

2.1.5. Causes of food insecurity in Ethiopia

The study conducted by Birara et.al (2015) on the assessment of food insecurity in Ethiopia: a review revealed that the worsening situation of food insecurity in Ethiopia is caused by population pressure, drought, shortage of farm land, lack of oxen deterioration of food production capacity, outbreak of plant and animal disease, poor soil fertility, frost attack, shortage of cash income, poor farming technology, poor extension service high labour westage, poor social and infrastructural facility, pre and post harvest crop loss.

Drought is an immediate cause of food insecurity in rural areas of Ethiopia, since it has a serious implication for food availability and access. Consecutive droughts in many parts of the country have depleted households' resilience to shocks and weakened coping capacity. The root causes of food insecurity in Ethiopia include structural factors such as degradation of the natural environment, population pressure that resulted in land fragmentation and land-per-capita decline, backward agricultural technology/poor performance of agricultural sector and land policy, limited opportunity for diversification of income sources, unemployment and, linked to the aforementioned, the wider economic factor of basic poverty (WFP and CSA, 2019)

Food insecurity incorporates inadequate energy intake, unstable access to food, and dependency on livelihood strategies that generates adequate food in good times but is not resilient against shocks and drought. 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. Poverty, fragility of natural resource, weak market and land tenure institutions and inconsistent government policies are factors contributing to chronic food insecurity (Devereux, 2000)

The new coalition on food security in Ethiopia (NCFSE) identifies the following as key constraints in food insecurity: recurring drought, limited sources of alternative incomes, population pressure limitations in technology, lack of product diversification

and market integration, limited capacity in planning and implementation, environmental degradation and limited access to credit (HPG, 2006).

2.1.6. Food insecurity situation in pastoral and agro pastoral communities in Ethiopia

In the past pastoralists or herders were considered as the richest people among rural communities, but nowadays the situation has reversed, and people living in range lands become the most vulnerable and even food insecure people. They often comprise a large portion of the world's poorest, with lowest official development indicators in such regions. Pastoral populations often rank among the poorest and most destitute agricultural peoples in the world, and are the most excluded from basic socio-economic services and infrastructure. This is the result of significant changes in the climate and environmental conditions as well as sociopolitical aspects that have been takes place in recent few years ago. Further such changes continuously associated to trends of diversification, frequent drought famine, food and social insecurity, migration, conflict and now insurgency in pastoral regions (Mohamed, 2015; IFAD, 2017).

Pastoralism in Ethiopia constitutes a unique and important way of life for close to 15 million people living in about 7 regions in the country. The pastoral areas mainly characterized by unpredictable and unstable climatic conditions, as well as ecologically fragile environment. Pastoral areas are also characterized by frequent draught, conflict; flood, poor infrastructure and high food deficit are the main characteristics of pastoral areas. Also low human capital manifested by very low primary & secondary schools gross enrollment rate (20 & 3% only) characterize extreme poverty in the pastoral regions (PFE, 2007). Food insecurity in pastoralist areas can also be viewed in terms of chronic food insecurity, and transitory or acute food insecurity. Those vulnerable to chronic hunger are households that are either subjected to frequent or severe and regular food insecurity, or households that have low resilience, or both. In contrast, households that suffered acute food insecurity or hunger do so over a shorter but very intense life threatening periods of drought (CAADP, 2009). At present, the main instrument for dealing with both categories of food insecurity in pastoralist area is food aid.

In Ethiopia, food insecurity is highly prevalent in moisture deficit highlands and in the lowland pastoral and agro-pastoral areas. Even in years of adequate rainfall and seasons of good harvest, the lowland agro-pastoralists remain food insecure and in need of food assistance. Droughts have become frequent and more severe in recent years and are one of the most important triggers of malnutrition and food insecurity in the country (Dominguez, 2010).

Pastoral and agro-pastoral livelihood systems in the lowlands of the country are among the most vulnerable to the impacts of climate change and variability (NMA, 2007). Over the past several decades, pastoral livelihood systems were affected by repeated droughts, famine and epidemics that relate to the changing climatic condition. As a result, the losses of losses of long lasting productive assets and increasing household food insecurity have become defining features of lowland poverty in Ethiopia (Beruk, 2003)

2.2. Empirical Literature

Mohammed (2015) conducted the study on intensity and determinants of pastoral household food insecurity: the case of harshin district of Somali region, Ethiopia. Binary logit model was employed and found that age of the household head, family size, and dependency ratio associated with food insecurity positively while, livestock holding affects household food insecurity status negatively and significantly in the study area.

Idris and Adam (2013) carried out their study on assessment of food insecurity, identifying coping mechanisms and its determinants among pastoral households of afar national regional state: the case of Chifra district. The required data was collected from three Kebelles of 120 randomly selected pastoral households. Results of descriptive and inferential statistics indicates using the calorie intake approach, 65.8% of sample respondents were food insecure, while 34.2% were food secure. The binary logit model result revealed that Family size, age of household head, dependency ratio, and livestock disease incidence are factors positively and significantly affect food insecurity. On the other hand, sex of household head, herd size, income from livestock production and non-farm income are factors negatively affect food insecurity in the study area. Further analysis showed that sale of sheep and goats, reducing number and size of meals; seasonal migration (some of the family

members), receiving food aid and borrowing cash or food from neighbors or relatives were the frequently practiced copping strategies by pastoralists of the study district.

The study conducted by Mebratu et al. (2018) on determinants of food insecurity among rural households in waliso district, south western Ethiopia, employing logistic regression model showed that household's education level and amount of land negatively affect food insecurity while, dependency ratio and amount of fertilizer has positive and significant relationship with household food insecurity status in the study area.

Fekadu and Mequanent (2010) on the study on determinants of food security among rural households of central Ethiopia using binary logistic regression model observed that age of household head, , offarm/non-farm income, use of chemical fertilizer, size of cultivated land, livestock ownership, oxen ownership and soil and water conservation practices has positive and significant relationship with food security. On the other hand, educational level of household head and family size were found to be negative and significant in determining household food security.

According to Teklay et.al (2015) on the work determinants and coping strategies of food insecurity in agro pastoral households of afar region (zone two), with specific objectives of identifying the major determinants of household food insecurity and listing out of local coping strategies. Primary data were collected from four Kebelles through structured questionnaire Results of descriptive and inferential statistics indicate that using the calorie intake approach, 35.67% of sample respondents were food insecure, while 64.33% were food secure. On the other hand, analysis of the logistic regression model showed access to agricultural extension services, participation in safety net program and educational status of household are identified as negative and significant determinants of household food insecurity. In contrast, sex of household head and family size are found to be positive and significant covariates of household food insecurity. Selling household asset and dropping children out of schooling were identified as the most severe coping mechanisms in the study area.

A study was conducted by Alem (2007) with the objective of identifying the main factors that affect household food insecurity in Tehuludere Woreda, South Wello Zone. It applied multivariate logistic regression model and the result shows that non-participation in off-farm activities, large family size, low annual production, small

farm size, dependency attitude on food aid, poor wealth status (less than the sample mean Tropical Livestock Unit) and insecure land tenure perception are factors that contribute positively and significantly to high food insecurity in the study area.

Mohamed (2016) carried out a study on food insecurity and copping strategies of agro pastoral households in awbar woreda, Ethiopian Somali regional state. He made the analysis based on household survey data collected from from140 households selected randomly and binary logit model was employed to identify the major determinants of household food insecurity. The results from descriptive statistics show that the majority 55.7 % of total surveyed households were food insecure. The binary logit model outputs show that age of the household head, dependency ratio and family size related negatively and significantly with household food security. In contrast cultivated land and oxen ownership are factors positively and significantly related with household food security. Furthermore, results show that households also used different coping strategies against food insecurity and these include, borrowing food or cash from relatives or neighbor's', reduced number of meals, reduced meal size, sale of livestock than usual and sale of fire wood and charcoal.

Abebaw (2003) also studied household food insecurity in rural Dredawa using binary logit model. Among the explanatory variables included in the model annual income, amount of credit received), irrigation use, age of household head, status of education, cultivated land size, livestock ownership and number of ox owned were found to be statistically significant and negatively affect household food insecurity status while, family size negatively related with food insecurity in the study area.

Ahmed et al. (2018) was conducted the study on the determinants of food insecurity and coping strategies of rural households: the case of Shalla district, west Arsi zone, Oromia region, Ethiopia using binary logit model. The result showed that family size, age of household head and dependency ratio had significant and positive effect on food insecurity, while gender, cultivated land, livestock ownership, oxen ownership, fertilizer use and income from safety net had a significant and negative effect on food insecurity. Sale of more livestock than usual, borrowing of food or cash, renting out of productive assets, child labor supply, reduced expenditure on health and education, reducing expenditure on productive inputs short term/seasonal migration, seek alternative or additional jobs, rely on less preferred and less expensive food, reduced

meal size, reduced adults meals for children to eat, reduced number of meals eaten in a day, gifts from neighbors and relatives, receiving relief food, participating in cash basis safety net public works were identified as most common coping strategies employed by households against food insecurity in the study area.

The study conducted by Misgina (2014) in Laelay Maichew Woreda, central zone of Tigray using logistic regression model observed total cultivated land holding size, total livestock holding, total annual income per AE, use of chemical fertilizer were found positively related and statistically significant to food insecurity status of rural households. Similarly, family size was related negatively and statistically significant to household food security status in the study area.

2.3. Conceptual frame work

After exploring literatures, independent variables for the study were identified. For the sake of simplicity, conceptual frame works of some 13 factors (variables) are identified. However, these are not the only factors affecting household food insecurity; nor it is affected by a single factor but combinations of factors exert impact either positively or negatively. Figure 2.1 below portrays the conceptual frame work to be applied in the study. It clearly depicts what the independent and dependent variables in the study. And hence household food insecurity status as dependent variable that was regressed against the independent variables of family size, age of household head, sex of household head, dependence ratio, total livestock owned in (tlu), distance from market center, literacy status of household head, food aid received, participation in safety net program, land holding per household, access to credit and nonfarm income.

Economic factors

✓ Livestock holding

✓ land ownership

✓ Non (off farm) income

Demographic factors

✓ Sex of household head
✓ Age
✓ Family size
✓ Dependency ratio
✓ Marital
✓ Literacy status

Household Food
Insecurity Status

Institutional factors and transfers

✓ Access to credit service
✓ Distance from Market
✓ Safety net participation
✓ Food aid
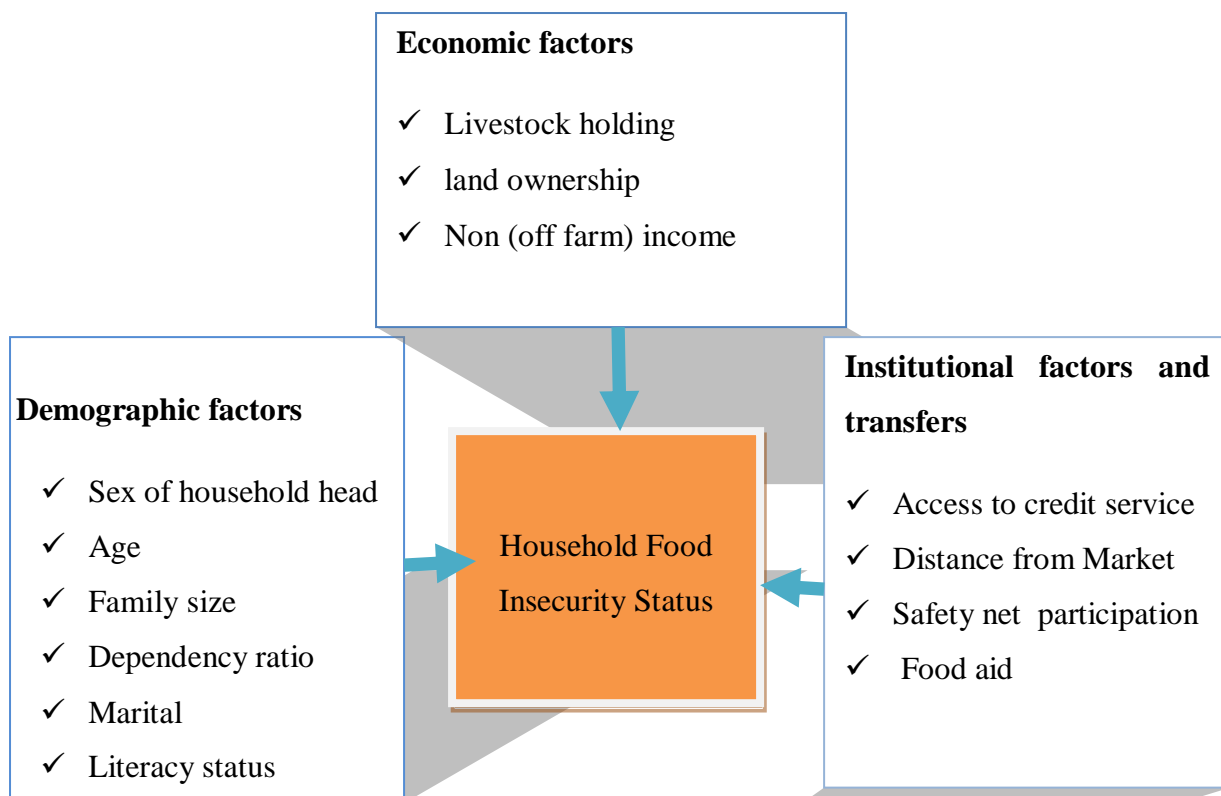
Figure 1: Conceptual frame work

Source: Analytical framework based on literatures

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CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1. Description of the study area

Afar National Regional State (ANRS) is one of the ten regions in the Federal Democratic Republic of Ethiopia. ANRS is situated in the north eastern part of the country and covers 10,086km^2 of land area. Its capital city is samara around 600 km far from the federal capital Addis Ababa. Administratively, the region is divided into five zones, which are further subdivided into 34 districts and 404 kebeles. Afar region has international borders with the countries; Djibouti in the east and Eritrea in the north east and shares the local borders with four regional states Tigray regional state in the North West, Somali regional state in the south east, Oromia regional state in the south and Amhara regional state in the south west.

An estimated population of the region is almost 1.9 million people, approximately two percent of the total Ethiopian population. About 81 percent of the population lives in rural areas, with pastoral and agro-pastoral livelihood systems and 19 percent are urban dwellers. Women make up about 44% of the population, and 56% are men. As elsewhere in the country, the population of Afar is young: 12 per cent is under-five years of age and 43% of the population is under 15 years of age. The total fertility rate in Afar region is high; 5.5. Approximately 95 percent of the Afar population is Muslims (CSA, 2019).

The region is geographically located between 39°34' and 42°28' East (longitude) and 8°49'and 14°30'North (latitude). It is characterized by the flat landscape with an altitude range of 116 meters below (Dalol depression) and 1600meters above sea level. (Ayalu Mountain) The agro-ecology of the region is predominantly featured by desert and semi-desert climate, prone to recurrent droughts resulting in heavy livestock mortalities, which is the basis of the livelihood of the population. The temperature varies from 20°C in higher elevations to as ha high as 48°C in lower altitudes. The climate of the region is typically one of the high temperature and low rainfall areas in the country (Yilma, 2005).

The seasonal climates of ANRS are:

- Karma, the main rainy season, covering the period from late-June to mid September

- Gillal, Short but cool dry season, occurs between September and March.

- Sugum, Short rainy season, occurs from March to April.

- Hagay, long and hot dry season, very hostile to the inhabitants, particularly to pastoralists, and their livestock and runs from May to June. Thus, 'Sugum' and 'Karma' rains often decide the intensity of drought scenario in ANRS.

Most of the region's population are pastoralist or agro-pastoralist and are very dependent on their livestock. Approximately, 90 percent of the population depends on subsistence pastoral production system while the remaining 10 percent pursue agro-pastoralism. Other income generating activities include crops such as sorghum, maize, barley, teff, cotton and honey production. The number of agro-pastoralists is increasing due to the development of irrigation infrastructure in the region (UNICEF, 2019). The Districts where agro-pastoralism is common are located along the Awash valley in zone one and three and those woredas located adjacent to Oromia, Amhara and Tigray regions, which include Argoba special, Afambo, Dubti, Asayita, and parts of Aba'ala, Megale and Koneba woredas. The inhabitants also involve in some other off-farm activities such as charcoal making for income.

The region is recognized as being hotspot for combination of high food insecurity, moderate to-high malnutrition rates, and rapid onset of emergencies like epidemic outbreaks, foods, or conflicts (UNICE, 2009). The Region also experienced the highest percentage (26.1%) of food-insecure households and about 41% of households in the region consumed three or fewer food groups (WFP and CSA, 2019).
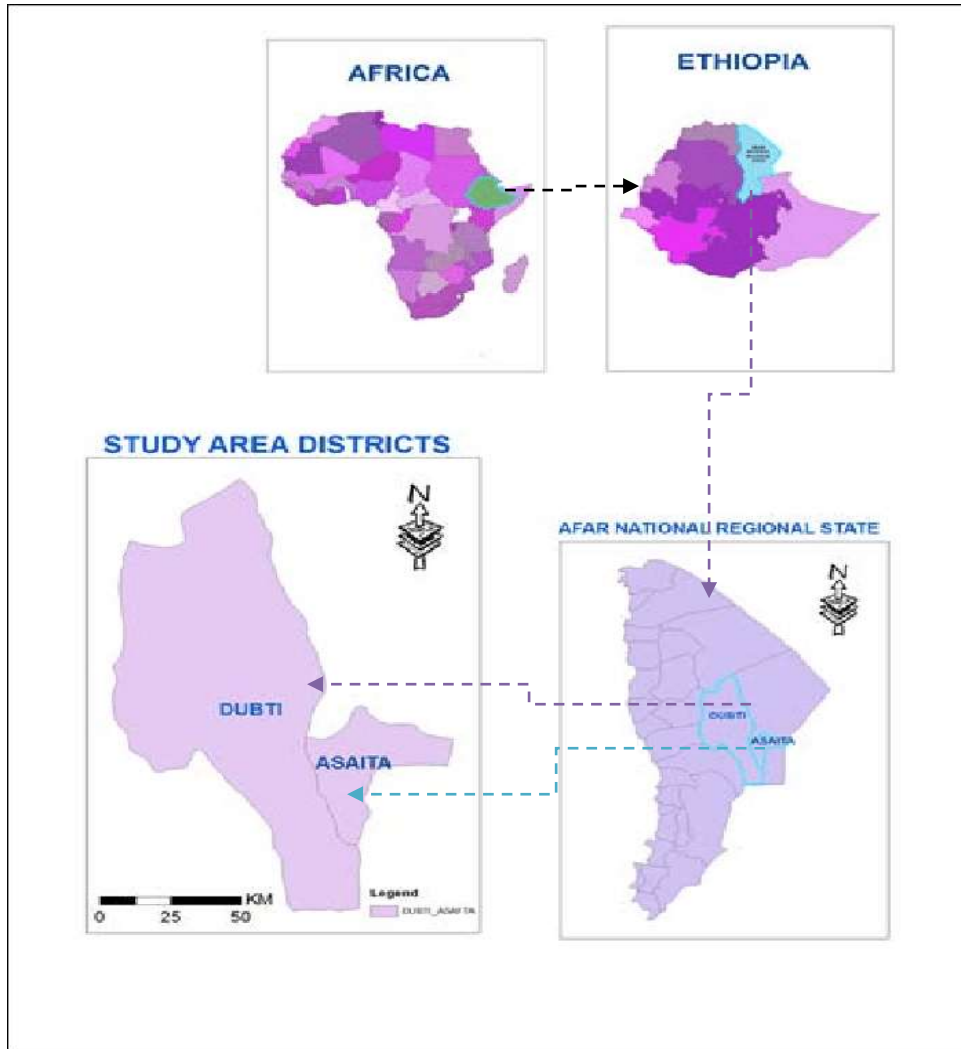
Figure 2: Map showing the study areas

3.1.1. Overview of Awsa Zone and sample districts

Awsa zone, the study area, is one of the five administrative zones in afar region. It was known as zone one before May 2006 and located in the lower part of Awash River. Administratively, Awsa is structured in to eight (8) woreda administrations those are Afambo, Dubti, Aysaita, kori, mille, Chifra, Elidar and adaar woredas and newly added one Garani. The largest town in awsa is Asayita (it was a capital city of Afar region before 2005). It has international borders with Djibouti on the east and on the northeast by Eritrea, local borders with Amhara regional state on west, with in the region on the south by gabbi rasu (southern zone), on the north by kiblati rasu (northern zone), and on the northwest by Fanti rasu (central zone).

Awash River is the largest river which crosses this zone. Mille and Logiya Rivers are its main tributaries. There are a chain of six interconnected lakes in this Zone, fed by

the Awash: from north to south they are Gargori, Laitali, Gammari, Bario and Lake Abbe (or Abhe Bad).

Based on Central Statistical Agency of Ethiopia (CSA, 2007), awsi zone has an estimated total population of 410,790, of whom 224,656 were men and 186,134 women. While 82,886 or 20.18% of the population were urban residents, a further 178,557, or 43.47%, were pastoralists. The zone covers an area of 30,242.10 square kilometers, and it has a population density of 13.58 persons per square kilometer.

3.1.1.1. Description of Dubti district

Dubti is one of the Districts in the Afar Region of Ethiopia. Part of the Administrative awsa zone. it is bordered on the south by the Somali Regional state, on the southwest by Mille woreda, on the west by Chifra woreda, on the northwest by the fanti rasu (central zone), on the north by Kori woreda, on the northeast by Elidar, on the east by Asayita, and on the southeast by Afambo. Towns in Dubti include Dubti, Logiya, and Semera (capital city of afar region).

Based on the national census conducted by the Central Statistical Agency of Ethiopia (CSA, 2007), Dubti woreda has a total population of 65,342, of whom 34,893 are men and 30,449 women; 32,940 or 50.41% are urban inhabitants.

3.1.1.2. Description of Aysaita district

Aysaita is one of the largest districts in Awsa zone of Afar Region, Ethiopia which has thirteen Kebeles; of which two are urban, six are pastoral, and five are agropastoral Kebeles. Total population of the district was 50,803 consisting of 27,284 men and 23,519 women. Of the total population 31,162 (66%) of its population live in rural areas and the rest 16,048 (34%) live in urban areas (CSA, 2007). Asayita district is bordered on the south by Afambo, on the west by Dubti, then on the north by the Awash River which separates it from Elidar, and on the east by Djibouti. The district has four clinics, three health posts, and one hospital. And Livestock population of the district is estimated to be 115,171 animals, of these cattle 71383, goats 23086; camels 16943 and 482 equine are found in the area (APARDB, 2015).

3.2. Data sources/Types of data

The study relied on both qualitative and quantitative types of data. Primary and secondary data's were the concerning sources of data to generate valuable and relevant information from respondents. Primary data collected from household heads using structured questionnaire and focus group discussions. Particularly, household-level consumption data was collected using 7(seven) day recall approach, quantities of food items consumed by household members within the seven consecutive days was recorded from each sampled household. In addition, information on the status of socio-economic, demographic and institutional factors that can determine food insecurity in the household level has been collected.

Secondary data collected from regional concerned bureaus, zone administration, woreda offices and nongovernmental organizations that implement different projects in afar region. And also it was gathered from officially published and unpublished materials: reports and former conducted researches and publications related with food insecurity. The survey were administered by using experienced enumerators who speak the local language (Afar af) fluently and they were trained on the objectives of study, sampling procedures, techniques of interviews, and data handling. The questionnaire was pretested in a community almost similar to the study population and therefore the necessary modification was made.

3.3. Sampling techniques

The study employed multi stage sampling procedures to get a representative data. In the first stage, two districts (namely, Dubti and Aysaita) selected purposively out of eight (8) districts in Awsa zone in consideration of population size, water resources, prevalence for food insecurity and poverty situation of the area. In the Second stage, three sample kebeles were selected from each of two districts by using simple random sampling techniques. Accordingly, from Aysaita (Gahirtu, Galifage and Barga) were selected and (Geega, Sekoyta and Unda Buri) kebeles were selected from Dubti. In the third stage, the total of 200 sample households were selected randomly from the households in the selected kebeles based on probability proportional to size sampling procedure.

3.4. Sample size determination

The target population of the study was pastoralists and agro pastoralist households living in Dubti and Aysaita districts of awsa administrative zone. There are the totals of 27,677 households in the study area CSA (2007). To determine sample sizes the study applied a simplified formula provided by Yamane (1967), which assumed a 95% confidence level and margin of error (e) 0.05.

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

Where, **n** is sample size   **N**, is the total number of households in study area, which is 27,677 and **e** = is the level of precision or sampling error, which assumed to be 0.07 for this study.

$$n = \frac{27,677}{1+27,677(0.07^2)} = 200$$

Therefore, for this study 200 households were randomly selected from the target population household selection.

Table3. 1: Sample distributions by districts

Woreda	Kebele	Households	Sample households	percentage	Cumulative share
Dubti	Geega	811	34	16.75	53.81%
	Sekoyta	923	38	18.8	
	Unda buri	884	35	18.26	
Aysaita	Barga	673	28	14	46.19%
	Gahirtu	814	34	16.8	
	Galifage	736	31	15.39	
Total		4841	200	100	

Source: own computation (2019) based on the number of households received from kebele administrations.

3.5. Data analysis methods

After the relevant data collected from primary as well as secondary sources the data were analyzed and interpreted using descriptive and econometric data analysis methods. Descriptive analysis: percentages, frequencies, means, standard deviations, maximum, minimum, t-statistic and chi-square are used. Econometric methods are employed to make inference about the population based on sample results. Particularly, binary logistic regression model was used to identify the factors that determine household food insecurity in the study area. The Foster-Greer-Thorbecke (FGT) indices employed to measure the incidence, depth and severity of food insecurity and also coping strategy index (CSI) was used to identify the coping mechanisms adopted by households.

Statistical softwers was used to analyze data due to the growing importance to utilize software packages. The data was entered using IBM SPSS Statistics version 20 and analysis was done using STATA version 14. FGT indices result was computed using Microsoft Excel 2007.

3.6. Measuring food insecurity status of household

Food insecurity at the household level is best measured by direct survey of income, expenditure, and consumption (Von Braun et al, 1992). Consumption rather than income is viewed as the preferred welfare indicator because consumption better captures the long-run welfare level than current income and may better reflect households' ability to meet basic needs. Income is taken as one of the elements that allow consumption. Consumption reflects the ability of household's access to credit and saving at times when their income is very low. Hence, consumption reflects the actual standard of living (welfare) and is better measurement than income (MOFED, 2012). As Bouis (1993) states measuring food insecurity by using the direct survey of household consumption method gives more reliable information than the household expenditure method.

In this regard, this study used direct survey of household consumption method and the data were collected on the basis of seven days recall method and the estimation of daily energy intake (kcal/d) from foods was done using the food composition table compiled by Ethiopian Health and Nutrition Research Institute (EHNRI, 2000). The seven days recall method is selected since it is appropriate for exact recall of the food

items served for the household within that week. If the time exceeds a week for instance 14 days, the respondent may not recall properly what he has been served before two weeks (gulled, 2016).

 In order to calculate the households' daily caloric intake, the total households' caloric intake for the last seven days divided by seven. The household's daily caloric intake per adult equivalent (AE) were calculated by dividing the household's daily caloric intake by the family size after adjusting for adult equivalent using the consumption factor for age-sex categories (Ahmed et.al, 2018). Adult equivalents are calculated in order to provide a standardized measure of food and nutrient intake that takes into account differences in the size and composition of households (Celeste, 2014).

 Subsequently, the calculated daily calorie intake was compared with the minimum daily subsistence requirement in adult equivalent of 2,200 Kcal per capita per day calorie consumption which is set by Ethiopian government (MoFED 2013). Accordingly, this minimum daily subsistence requirement were used as a cut-off point to separate food secure and insecure households in which case the household meeting at least this minimum level will classify as food secure and if not food insecure.

3.7.   Measuring the incidence, depth and severity of food insecurity

The most widely used indices to measure food insecurity are the percentage of the food insecure (headcount index), the aggregate food insecurity gap index and the distribution of consumption among the food insecure (food insecurity severity index). Many alternative measures exist, but the three measures described below are the ones most commonly used.

Headcount index (Incidence of food insecurity):   this is the proportion of the households whose consumption is below the food poverty line; that is, the share of the population that cannot meet the minimum calorie intake required.

Food Insecurity Gap (Depth of food insecurity).This provides information regarding how far households are from the food poverty line. This measure captures the mean aggregate income or consumption shortfall relative to the food poverty line across the whole population. It is obtained by adding up all the shortfalls of the food insecure (assuming that the food secure have a shortfall of zero) and dividing the total by the population. In other words, it estimates the total resources needed to bring all

the food insecure groups to the level of the food poverty line (divided by the number of individuals in the population).

Squared Food Insecurity Gap (**Severity of food insecurity***)* This takes into account not only the distance separating the food insecure; from the food poverty line (the food insecurity gap), but also the inequality among the food insecure households, that is, a higher weight is placed on those households further away from the food poverty line.

More precisely, these measures can be defined in terms of the well-known **Foster-Greer-Thorbecke (FGT)** (1984) P_α class of poverty measures that may be written quite generally, as:

$$\mathbf{P_\alpha = \frac{1}{N} \sum_{i=1}^{n} \left[\frac{z - yi}{yi} \right]^\alpha}$$

Where **N** is the size of the sample, **Z** is the food insecurity line (food poverty line), **yi** the per capita calorie intake of household i adjusted for per adult consumption expenditure, **n** is the total sum of food insecure households ordered from bottom to food poverty line.

Here, **α** is a parameter reflects the concern attaches to the proportionate shortfall from the food poverty line. When α is larger the index puts more weight on the position of the food insecure. If α = 0, there is no concern about the depth of shortfall is shown and the corresponding index is called the ***headcount index*** (P_0). If α =1, the poverty index is called poverty ***gap ind***ex (P_1) and can also be interpreted as an indicator of potentials for eliminating food insecurity if transfers were perfectly targeted. But it does not capture the differences in the severity of food poverty among the food insecure households. Thus $\mathbf{p_2}$ (where α = **2**) measures the squared proportional shortfalls from the food insecurity cut off point, which is commonly known as an index of the severity of food insecurity.

3.8. Household Coping strategies

Coping Strategies Index (CSI) was employed for this study to measure the household coping strategies in the study area. CSI is an indicator of household food security that is relatively simple and quick to use, straightforward to understand, and correlates well with more complex measures of food security. A series of questions about how

households manage to cope with a shortfall in food for consumption results in a simple numeric score. In its simplest form, monitoring changes in the CSI score indicates whether household food security status is declining or improving (Maxwell et al., 2003).

CSI is constructed employing a series of questions on how households deal with a shortfall in food for consumption. According to Maxwell and Caldwell (2008), there are four important steps to be followed while constructing the coping strategies:

Step1. **Coping Behavio**r: Getting the Right list for the Location

The first step is to determine the locally relevant coping strategies in the study area. These falls into four basic categories: Dietary change, short-term measures to increase household food availability, short-term measures to decrease numbers of people to be feed and rationing, or managing the shortfall

Step2. **Frequency**: Counting the Frequency of Strategies

A longer recall period generally provides information that is more representative of typical behaviors, but the longer the recall period, the less accurate the memory of respondents about their actual behaviors. Hence, questions here in this study are based on thirty-day recall period.

Step3. Severity: Categorizing and Weighting the Strategies

Different strategies are "weighted" differently, depending on how severe they are considered to be by the people who adopt them. The frequency answer is then multiplied by a weight that reflects the severity of individual behaviors.

Step4. Scoring: Combining Frequency and Severity for Analysis

In order to conduct an analysis of the results of CSI, two more pieces of information are required. The first is a means of scoring the relative frequency; the other is a means of scoring weight, just derived in Step 3. Each coping strategy has a standard weight related to its severity and is calculated using the following equation.

$$\textbf{CSI} = \sum_{i=0}^{k} \text{FW}$$

Where, F = Frequency of the ith coping strategy used by a household in the past thirty days W= the severity weight given to the ith coping strategy K = Number of the coping strategy. It is important to ensure that the values for both the frequency and the severity influence the CSI score in the same way. That is the higher the frequency, the higher the score; and the greater the severity the higher the severity weighting (Maxwell and Caldwell, 2008).

Focus group discussions were held in each sample Kebele to list out the common coping strategies adopted by households in the study area when they face shortage of food supply and rank them based on their severity so as to assign weight to each strategy.

3.9. Determinants of household food insecurity

When the dependent variable in a regression model is dichotomous (which is the case in this study), the analysis is conducted using linear probability or logit or probit models. Logit or probit models generate predicted values between 0 and 1, and they fit well to the non-linear relationship between the probabilities and the explanatory variables (Gujarati, 2004). Different models can be employed to analyse the determinants food insecurity status. For this study logistic regression model is employed to analyze and interpret the determinants of food insecurity at household level. According to C.S. Maddala (1992); if explained (dependent) variable y is a dichotomous variable, taking the values either 1 or 0, it can be analyzed by using linear probability model. The variable y is the indicator variable. Thus, the dependent variable (food insecurity status) is a dichotomous, which takes a value of the value y = 1 if the household is food insecure and y = 0 if a household is food secure. The minimum daily subsistence requirement in adult equivalent of (2,200 Kcal) determined by Ethiopian Health and Nutrition Research Institute (EHNRI) were used as a cut-off point to separate food secure and insecure of sampled households.

The logistic distribution function for assessing factors determining the food security status of the households can be specified, following Gujarati (2004), as:

$$p(i) = \frac{1}{1+e^{-zi}}$$ -- (1)

Where: P (i) - is a probability of a household being food insecure for ith household e - represents the base of natural logarithms (2.718) and Z_i - is a function of m explanatory variables (Xi) And is expressed as:-

$$\mathbf{Z_i = \beta_o + \beta_1 x_1 + \beta_2 x_2 + \cdots \cdots \beta_m x_m} \text{\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash} \textbf{(2)}$$

Where βo is the intercept and βi is the slope parameter in the model which is estimated using maximum likelihood method.

The odds ratio to be defined as the ratio of the probability that a household is being food insecure pi to the probability that food secure (1-Pi), it may described by the following relationships

$$\left(\frac{p}{1-p}\right) = \frac{1+e^{zi}}{1+e^{-zi}} = e^{zi} \text{\ \textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash} \textbf{(3)}$$

And

$$\left(\frac{p}{1-p}\right) = \frac{1+e^{zi}}{1+e^{-zi}} = e^{\beta0+\Sigma\beta i X} \text{\ \textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash} \textbf{(4)}$$

Taking the natural logarithms of the odds ratio will result in what is known as the logit model as indicated below.

$$\left(\frac{p}{1-p}\right) = \frac{1+e^{zi}}{1+e^{-zi}} = \ln\left[e^{\beta0+\Sigma\beta i X}\right] = zi \text{\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash\textemdash} \textbf{(5)}$$

If the disturbance term Ui is taken in to account the logit model becomes:

$$\mathbf{Z_i = \beta_o + \sum \beta_i x_i + U_i} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \textbf{(6)}$$

Based on empirical literatures reviewed, thirteen explanatory variables were identified and the final logit model was specified as follows:

Zi = β0+ β1AGE +β2SEX+ β3 FAMAD + β4 DR + β5 TLU + β6 DMKT + β7 EDUL + β8 MARITAL + β9 AID + β10 PSNP + β11 LND + β12 CREDIT+β13NONFRM

3.9.1. Definition of variables and hypothesis

Household food insecurity (FODINS): is a dichotomous dependent variable in the model and it takes 1 if the household is food insecure, 0 otherwise. The food secure household from insecure will be identified by comparing the total food calorie available for consumption in the household per AE to the minimum level of subsistence requirement per AE (2200 kcal). Household consuming above this threshold is said to be food secure, otherwise food insecure.

Age of household head: Age is a continuous explanatory variable peculiar to the household head. Age of household head is expected to have negative effect on household food insecurity status because households need knowledge and experience in food production, animal rearing, farming and wealth accumulation through time which older household heads would enable households to be food secured than younger household heads (Ayalew, 2004; Alem, 2007).

Sex of the household head: is a dummy variable taking 1 if a household head is male and 0 otherwise. Household head is a person (can be male or female) who manages the household, supports economically and for age or some reasons he is respected and considered as head by other members of the household (Bashir, 2010). Male household heads have more tendency of engaging in different activities than female heads as they are less engaged with domestic activities and this will improve their income and food consumption. Therefore, it is expected that male headed households have more chance to be food secure and negative relationship with food insecurity.

Family size: family size represents a total number of family members living together in one household adjusted to adult equivalent. The relationship between family size and household food insecurity is expected to be positive. This is because of high dependency burden households with large number of members will face food insecurity (Ayalew, 2004).

Dependency ratio: this is the ratio of children under age 15 and old age of above 64 to active members expressed in terms of adult equivalent (age 15-64). If non-productive age groups (under age 15) are higher than adults or productive age groups in a household, the probability of the household to be food insecure will be high. Thus, it is hypothesized that households with large dependent individual are deemed

to be food insecure. Therefore, the relationship between dependency ratio and household food insecurity is expected to be positive.

Literacy of household head: is a dummy variable taking the value 1 if household head can read and write and 0 if the household head is illiterate. A Household head with better educational level have higher chance to improve the food security status of his family through diverting to other income generating activities and a household heads with Lower educational level and illiteracy are directly related to food insecurity (Mohamed, 2016). The household head is highly influential in decision making process in the pastoralist family of the study area; his educational background is believed to have a chance to diversify household's income sources. So t hat educational status of household head is expected to have a negative relationship with food insecurity status.

Marital Status of Household Head (MARITAL)

It is dummy variable taking a value of 1 if the household head is married and 0 otherwise. It is hypothesized that marital status has negative relationship with household food insecurity in relation to the economic scale of consumption items purchased and pooling available resources in one way or another. Possibly, married peoples are expected to reduce expenditure that would have been spent separately. Marital status and sex of household heads seems to be contradictory but headship is not only gifted to male there were female household heads in the presence of male (husband) either due to economic reasons or absence of male household head in the area for any reasons. In general, being married in itself is not a guarantee of escape from the risk of food insecurity. Rather, it is mainly because of other factors household size, level of income and others of household affect food in security status in relation to marital status.

Total livestock owned in (TLU): this is the total number of livestock holding of the households measured in Tropical Livestock Unit (TLU). Livestock are the source of livelihood of pastoralists and agro pastoralist communities in the low land of Ethiopia. Households who have large numbers of livestock are expected to be less exposed to food insecurity. Because they obtain more milk, milk products and meat for direct consumption. Besides, households with large livestock holding can obtain more cash income from the sale of live animals and livestock products which are often used for

purchase of food grains during time of food shortage (Bashir, 2010; Indris, 2012). Therefore, it is expected that livestock holding have a negative impact on food insecurity.

Distance from market center: It indicates the distance between the home and the nearest market that the household usually made transaction which is measured in hours. According to (Wali, 2012) closeness to market centers create access to additional income by providing opportunities of selling livestock and livestock products as well as get opportunities of engaging in employment and easy access to inputs and transportation. Thus it is expected that household nearer to market center have better chance to improve food security status than who do not have a proximity to market center. Therefore, in this study it is hypothesized that distance to nearest market centre has positive relationship with food insecurity.

Nonfarm (off farm) income: It is continuous variable which is measured in birr. It represents the amount of various non-farm incomes obtained from different sources received (in cash or in kind) by the any of the household members in the year other than the sale of livestock, livestock products and income from crop sale. In this regard, households who are engaged in activities like receiving income from remittance, rent of pack animals and other informal business are better endowed with additional income to meet their food and non-food requirements (Indris, 2012). As a result, it is expected that households who managed to earn higher non-farm income are less likely to be food insecure. Therefore non-farm income is expected to have a negative impact on food insecurity.

Food aid received: It's a dummy variable, 1 if the household head receives food aid, 0 otherwise. Households in the study area are vulnerable to food insecurity, and mostly cover their food short falls through emergency food aid. So, the amount of food aid received by the household is good indicator of household food insecurity. As a result, it is expected that households receiving food aid are more likely to escape from the risk of food insecurity. Therefore, food aid was expected to have a negative association with food insecurity.

Land holding per household (ha): This variable represents the total cultivated land size of a household and measured in hectares. Large size of cultivated land size is associated with higher amount of output. Therefore, It is expected that farmers who

have larger cultivated land are more likely to be food secure than those with smaller land area. Therefore, it is hypothesized that size of cultivated land and food insecurity has negative relationship.

Access to credit: It's a dummy variable, 1 if the household head receives credit, 0 otherwise. Credit is an important source of income which enables households to purchase agricultural input (improved seed, fertilizer, etc...) or to buy livestock for resale after they fattened them. All these activities raise income of the household. Moreover, households who have easy access to credit at times of food shortage can copy the risk by using the credit they got directly for food consumption. Hence it is hypothesized that credit will have a negative impact on food insecurity.

Participation in safety net program: It is a dummy variable (i.e. 1 if it is beneficiary and 0 otherwise non-beneficiary. The safety net Program is provided to protect asset reduction at the household level and create communal assets at the community level labor intensive public works and direct support for labor poor households are the components of the program. The able bodies are engaged in public works for which they are paid a minimum amount, while the labor poor are provided the same amount for free. Hence, households who get an opportunity to participate in the safety net program are more likely to obtain food and /or cash aid which might help them to enhance their food supply and/or purchasing power and thereby making them more food secure among others (Teklay et.al, 2015). Thus it is expected that participation in SNP will affect food insecurity negatively.

Table3. 2: Summary of variable measurement and Hypothesis

Dependent variable =   Household food insecurity status

Variables	Types variables	Expected signs	Variable description
FAMAD	Continuous	positive	Family size per adult equivalent
AGE	Continuous	Negative	Age of household head
SEX	Dummy	Negative	Sex of household head
DR	Continuous	positive	Dependence ratio
TLU	Continuous	Negative	Total livestock owned in (TLU)
DMKT	Discrete	Positive	Distance from market center
EDUL	Dummy	Negative	Education level of household
MARITAL	Dummy	Negative	Marital status of household head
AID	Dummy	Negative	Food aid received
PSNP	Dummy	Negative	participation in SNP
LND	Continuous	Negative	land holding per household
CREDIT	Dummy	Negative	Access to credit
NONFRM	Continuous	Negative	Nonfarm income

CHAPTER FOUR

RESULTS AND DISCUSSIONS

In this chapter the results from descriptive, econometric analysis and FGT food insecurity measures are presented and discussed. Descriptive statistics includes mean, frequency distribution, standard deviation, minimum and maximum. Inferential statistics also employed t-statistics and chi-square in order to compare the food secure and food insecure household groups in respect to demographic, socio economic and institutional variables. Logistic econometric model was used to identify the determinants of food insecurity and FGT indices employed to measure the incidence (head count ratio), depth and severity of food insecurity.

4.1. Food Insecurity Status of Households in the study area

Daily calorie intake per adult equivalent of households were calculated and compared with the minimum daily subsistence requirement in adult equivalent of 2,200 Kcal. Associated with this minimum recommended calorie requirement of (2200 kcal) the result of study revealed that out of the total 200 surveyed households 62% were found to be food insecure and 38% were found to be food secure. In other words among sampled households 124 were unable to meet their minimum daily requirement while only 76 of them were able to meet their minimum calorie requirement.

The table 4.1 below shown that the mean per capita calorie intake of the respondent households was 2042.304 kcal, which is lower than the minimum required amount of energy which is 2200kcal/day. The mean calorie intake of food secure households is 2837.541 whereas, that of food insecure households is1554.9 Kcal /AE/ day. The mean comparison test (t=18.4995) with (prob>t=0.0000) assured that there is statistically significant difference between food secure and food insecure households with respect to energy consumption. Thus, the study area could be regarded as food insecure given the fact that the majority (62%) of sampled households were unable to get the minimum daily calorie requirement for an individual to live healthy and active life.

Table4. 1: **Food insecurity Status of the households**

Food security status	Per capita kilocalorie Consumption per day				
	Mean	St.deviation	Minimum	Maximum	**t-statistics**
Secure (N=76)	2837.541	579.3978	2208.82	4793.98	t = 18.9130***
Insecure (N=124)	1554.9	379.6951	479.942	2199.1	Prob > t = 0.0000
Total	2042.304	777.9327	479.942	4793.98	
Mean difference	1282.641				

Note: ***Significant at 1 percent probability level

Source: Own survey, 2020

4.2. Demographic characteristics of households

This sub section discusses the demographic characteristics of the surveyed households in the study area. The household characteristics were compared to see the difference among food secure and food insecure groups of households. Thus, among different demographic variables age of household head, sex of household head, family size per adult equivalent (AE), dependency ratio, marital status of household head and educati onal status of the household head are important demographic characteristics that could affect the food insecurity status at the household level included in the study.

4.2.1. Age of household head and food insecurity status

Household head age is considered as an important factor pertaining to an individual's personality make up, since the needs and the ways in which an individual thinks are closely related to the number of years a person lived (Asghar et.al, 2013). The survey result (table **4.2**) indicates that the average age of respondent household heads were 40.60(SD=12.15) years with maximum 82 and minimum age of 20 years in the study area. The mean (average) age of food insecure household heads was 40.91 (SD=12.02) years ranging from 20 to 74 years respectively. In this regard, the average age of food secure households also were 40.10(SD=12.41) years with minimum and maximum of 23 and 82 respectively. The statistical analysis (mean comparison t-test) of the study shows that the mean age of food secure household heads were not significantly different from that of food insecure household heads.

Table4. 2: Age of household head and food insecurity status

Food security status	Number	Age distribution of household heads				
		mean	St.deviation	minimum	Maximum	t-statistics
Secure	76	40.10526	12.41674	23	82	
Insecure	124	40.91129	12.02573	20	74	t = 0.4544
Total	200	40.605	12.15102	20	82	
Mean difference		0.8060				

Source: Own survey, 2020

4.2.2. Sex of household head and food insecurity status

The survey result presented in table 4.3 reveals that female as household head comprise 17.5 percent (35) of sampled households. A majority of respondents 82.5 percent (165) were male head household. There are more male-headed than female headed sampled households as it was very difficult to get information from women due to cultural and religious protocols. The study also found that around 85.52 % (65) of food secure and 80.65 %(100) of the food insecure households were male headed while, 14.48(11) and 19.35 %(24) of the food secure and food insecure households were headed by females respectively. As it was hypothesized earlier that male headed households have more chance to be food secure than female headed ones has not been met. The statistical test result revealed that there is no significant difference between food secure and insecure households with respect of sex.

Table4. 3: Sex of household head and food insecurity status

Sex of household head	Household food security status						χ^2
	Secure(N=76)		Insecure(N=124)		Total (N=200)		
	Frequency	Percent	Frequency	percent	Frequency	percen	
Male	65	85.52	100	80.65	165	82.5	
Female	11	14.48	24	19.35	35	17.5	0.777
Total	76	100	124	100	200	100	

Source: Own survey, 2020

4.2.3. Family size (AE) and food insecurity status

Family size is also an important factor for the assessment of food insecurity. It was hypothesized that family size has positive relationship with household food insecurity status. Household size is measured by adult equivalent in a household. Increase in family size tends to increase pressure on the household consumption. The survey result **(Table 4.4)** indicates that, the mean family size adjusted by adult equivalent (AE) of overall sampled households was 4.95 with standard deviation of 2.08 and the minimum and maximum family sizes of sampled households were 0.95 and 12.9 weighted in adult equivalent. The data also revealed that the mean family size of food secure and food insecure households was 4.66 and 5.13 with the standard deviations of 1.99 and 2.12 respectively. This result approved larger the family size higher the chances to be food insecure as it requires more money in order to meet both food and other daily needs for more person. Also it was found that the mean of the family size measured by AE was found to be significantly different between food secure and food insecure households at less than 10 percent probability level.

Table4. 4: Family size (AE) and food insecurity status

Food insecurity status	Family size per adult equivalent						
	Number	%	Mean	St.dev.	minimum	maximum	t-statistics
Secure	76	38	4.66	1.9982	0.95	9.87	
Insecure	124	62	5.135	2.1237	1	12.9	t = 1.5602*
Total	200	100	4.955	2.0845	0.95	12.9	
Mean diff.			0.461				

Note: *Significant at 10 percent probability level

Source: Own survey data, 2020

4.2.4. Dependency ratio and food insecurity

The survey result from the **table 4.5** revealed that the mean (average) dependency ratio of the sampled households were 1.38 (SD=1.0707) with minimum and maximum of 0(zero) and 7 respectively. The mean (average) dependency ratio of food secure households was 1.25(SD=0.7617) with minimum and maximum of 0 and 4 respectively, where as the mean (average) dependency ratio of food insecure households was 1.45(SD=1.218) with minimum of 0 and maximum 7. It was

hypothesized that the higher the dependency ratio the more likely to be food insecure. But the mean comparison test (t = -1.3211) indicates that there is no significance mean difference among food secure and insecure households interms dependency ratio.

Table4. 5: Dependency ratio and food insecurity

Food insecurity status	Dependency ratio of households						t-statistics
	N	%	Mean	St.deviation	minimum	maximum	
Secure	76	38	1.2515	0.7617104	0	4	
Insecure	124	62	1.4572	1.218522	0	7	t= -1.3211
Total	200	100	1.3791	1.070712	0	7	
Mean diff.			0.2057				

Source: Own survey, 2020

4.2.5. **Educational status of household head and food insecurity status**

Educational attainment of the household head is an important factor that mostly expected to have a high influence on household food insecurity status. The survey result **(Table 4.6)** depicts that among the sampled household heads the majority 118(59%) were illiterate and the remaining 41% was literate. The survey also indicated that from food secure households 46(60.52%) were headed by illiterate household heads and 30(39.48%) were headed by literate household heads. Among food insecure households 72 (58.06%) household heads were illiterate and 52(41.94) were literate. This result shows that household heads who has highest levels of education were less likely to be food insecure than those who are illiterate. In addition, the chi-square test result shows there is significant difference between food secure and food insecure households in their educational level of household heads at less than 5 percent probability level.

Table4. 6: **Literacy status of household head**

Literacy status of household head	Household food insecurity status						
	Secure(N=76)		Insecure(N=124)		Total(N=200)		
	Freq.	Percent	Freq.	percent	Freq.	percent	χ^2
Illiterate	46	60.52	72	58.06	118	59	
Literate	30	39.48	52	41.94	82	41	16.2854**

Source: Own survey, 2020

4.2.6. Marital status of household head and food insecurity status

It was hypothesized that being married increases the probability to be food secure than the others in a sense that married peoples are expected to reduce expenditure that would have been spent separately. The result (**Table 4.7)** reveals that from overall sampled household heads the majority 167(83.5%) were married while about 33(16.5%) were others (divorced, widowed and not married). The survey result also indicated that among the respondent household heads the majority of both secure and insecure 59 (77.63%) and 108 (87.09%) were married respectively. While, both of food secure and food insecure 22(17.37) and 16(12.91) were not married. This shows that majority of the sampled household heads were married. These high percentages of married respondents may be attributed to the simplicity of married life, which reflects a social stability in the study area. The chi square result shows there no significant difference between food secure and insecure households interms of marital status.

Table4. 7: **Marital status of household heads**

Marital status of HH heads	Food insecurity status of household						
	Food Secure		Food Insecure		Total		χ^2
	Freq.	percent	Freq.	percent	Freq.	Percent	
Married	59	77.63	108	87.09	167	83.50	
Others	17	22.37	16	12.91	33	16.5	5.0859
Total	76	100	124	100	200	100	

Source: Own survey, 2020

4.3. Socio- economic and institutional factors

4.3.1. Livestock ownership of households in tropical livestock unit (TLU)

Another important factor to assess the food insecurity status in pastoral and agro pastoral households is livestock holding. Livestock ownership plays a key role in contributing to food security through enabling direct access to livestock products

(milk, meat), providing cash income from sale of livestock and livestock products for purchasing food, draft power and a means of transport for pastoral households.

The survey results presented in Table 4.8 shows the mean livestock holding weighted by tropical livestock unit (TLU) of total sampled household's in the study area was 11.96 with standard deviation of 15.08. The average livestock holding (TLU) of the food secure households were 13.83 (SD= 13.872) whereas the average TLU's of food insecure households were 10.82 (SD=15.72418). The minimum and maximum TLU of the sample household respondents of in the study area was 0.13 and 105.79 TLU respectively. This result indicates that households having higher livestock were obviously more likely to be food secure, as compared to households with low livestock ownership. There is statistically significant difference between food secure and insecure household given the mean comparison value (t=1.37) with (Prob > t = 0.086) which is significant at less than 10 percent probability level.

Table4. 8: **Livestock ownership of households in tropical livestock unit (TLU)**

Food insecurity status	Households livestock ownership in (TLU)						
	Number	%	Mean	St.dev.	minimum	maximum	t-statistics
Secure	76	38	13.83263	13.872	0.16	105.79	
Insecure	124	62	10.82532	15.7241	0.13	76.15	t= 1.3717*
Total	200	100	11.9681	15.0827	0.13	105.79	
Mean difference			3.00731				

Note: *Significant at 10 percent probability level

Source: Own survey, 2020

4.3.2. Land holding per household

Land holding is one of the natural capitals of the households that determine the food availability (security) of the households. Under subsistence agriculture, land holding size is expected to play a significant role in influencing farm households' food security (Degefa, 2005).

The mean of farm size measured by (hectare) of the sampled households in the study area was 0.6218 (SD = 1.100) hectare. The mean farm size of food secure households was 0.95 (1.3652) whereas the mean of the food insecure households was 0.4205(SD= 0.845). In the study area, as witnessed by the survey result there was significant

difference in the mean cultivated land size between the food secure and food insecure households at less than 1% probability level (p<0.01).

Table4. 9: **Land holding per household**

Food insecurity status	Land size per household (hectare)				
	Number	%	mean	Standard deviation	t-statistics
Secure	76	38	0.95	1.365256	
Insecure	124	62	0.42056	0.8451322	t = 3.3915***
Total	200	100	0.6218	1.100185	
Mean difference			0.53		

Note: ***Significant at 1 percent probability level

Source: Own survey, 2020

4.3.3. Distance from market

The survey result shows the average distance (measured by hour) from near market place of total sampled households was 4.83(SD= 2.352) hours ranging from 1 to 10 hours. The average distance of food secure and insecure households from near market center was 4.67(SD=2.5828) and 4.92(SD=2.204) hours respectively. The statistical test implies that there is no significance mean difference between food secure and insecure household groups given distance from nearest market centre.

Table4. 10: **Distance from market center**

Food insecurity status	Distance from market center (in hour)						
	N	%	Mean	St.deviation	Mini	Maxi	t-value
Secure	76	38	4.6776	2.582898	1	10	
Insecure	124	62	4.9193	2.204381	1	10	t = - 0.7046
Total	200	100	4.8275	2.351946	1	10	

Source: Own survey, 2020

4.3.4. Non-farm (off farm) income

Non-farm/off farm activities play a vital role in contributing to food security in pastoral and agro-pastoral areas and households engaging in more off/non-farm activities are more likely to generate additional income and have less chance to be food insecure. Crop production and income from livestock sale are not sufficient for households to sustain food security in the study area. Based on this, it was

hypothesized that the amount of off/non-farm income earned from different activities measured in birr are negatively correlated with household food insecurity.

According to the table (4.11) the mean annual offarm income of surveyed households was 10834.81 with standard deviation of 5631.422. The mean annual nonfarm income of food secured household was 10022.84(SD=5477.717) while the average annual nonfarm income for food insecured households was 11332.4(SD=5688.134). It was hypothesized that non farm income has negative impact on household food insecurity in the study area. But the result show that hence, households' opportunity to have access in nonfarm income was limited and its contribution for household food security is not that much significant. The survey result also witnessed that there is no significant difference in the mean nonfarm income between two groups in the study area at less than 5% probability level ($p < 0.05$).

Table4. 11: **Annual non farm income**

Food insecurity status	Annual non farm income				
	Number	%	Mean	St.deviation	t-statistics
Secure	76	38	10022.84	5477.717	
Insecure	124	62	11332.47	5688.134	t = -1.6026
Total	200	100	10834.81	5631.422	
Mean diff			1309.627		

Source: own survey, 2020

4.3.5. Food aid and food insecurity

Food aid that provided to targeted food insecure households can play a positive role in enhancing food security. it was hypothesized that households receiving food aid are more likely to escape from the risk of food insecurity than non receivers since, the amount of food aid received by the household is good indicator of household food insecurity.

The survey result presented in Table 4.12 shows that among 200 sampled households, 153(76.5%) were received food aid while only 47(23.5%) were not received food aid. From food secure and insecure households 62(81.5%) and 91 (73.40%) were reported that they received food aid respectively. And also 14(18.50%) of food secure and 33(26.60%) of food insecure household reported they were not receive any food aid.

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This indicates large numbers of households are dependent on food aid and it has significant contribution to sustain household life in this area. The result from chi square test shows that there is no significant difference between food secure and insecure household's interms of receiving food aid because the food aid is distributed without discriminating the food secure and food insecure group of households in the study area.

Table4. 12 Food aid received

Food aid received	Household food security status						χ^2
	Secure(N=76)		Insecure(N=124)		Total(N=200)		
	Frequency	%	Frequency	%	Frequency	%	
Yes	62	81.50	91	73.40	153	76.50	
No	14	18.50	33	26.60	47	23.50	1.758
Total	76	100	124	100	200	100	

Source: Own survey, 2020

4.3.6. Access to credit service

Regarding to credit services about 41(20.50%) of the respondent has reported that they had access to credit service, while the majority of the respondents 159(79.50%) reported that they did not have access to credit service. From food secure households 17 (22.37%) and 59 (77.63%) have access and did not have credit access respectively. From Food insecure households 24 (19.35%) have an access to credit and 100 (80.65%) did not have an access to credit. The chi-square result revealed that there is no statistically significant difference between food secure and food insecure households in access to credit service at less than 5% level of probability. It shows that access to credit service has no significant effect on food insecurity status of the pastoral and agro pastoral households. This could be due to the absence of formal financial institutions (credit and micro-finance services) which provide interest free credit services in study area to support the income generation activities of households. Another reason could be the household's inability to use the credit received for the planned purpose.

Table4. 13. Access to credit service

Access to credit service	Household food security status						χ^2
	Secure(N=76)		Insecure(N=124)		Total(N=200)		
	Frequency	Percent	Frequency	percent	Frequency	percent	
Yes	17	22.37	24	19.35	41	20.50	0.2626
No	59	77.63	100	80.65	159	79.50	
Total	76	100	124	100	200	100	

Source: own survey, 2020

4.3.7. Participation in pastoral safety net program

PSNP program is provided to enhance sustainable land management, to protect property reduction at the household level and to create collective assets at the community level and labor intensive public works and direct support for labor poor households in order to insure long term food security of the country (Teklay et al., 2015). It is targeted to selected vulnerable woredas in food-insecure and disaster-prone rural areas. According to EDHS (2014) 66 per cent of rural households in Afar region were in the PSNP compared to 11 per cent of households at the national level in 2014. This is the highest coverage rate in the country.

The survey result indicated that from over all respondent household 141 (70.50%) were participants of productive safety net program and 59(29.50%) were not participants in the study area. 54 (71%) and 87(70.16%) of food secure and insecure households are participants of safety net program respectively. On the other hand 22(29%) of food secure and 37(29.84%) of food insecure households were non partici pants.

The statistical result indicates that there is no statistically significant difference betwe en food secure and food insecure households in participating in to pastoral safety net program at less than 5 percent probability level. This is due to the poor targeting performance of the program in the study area. Pastoral safety net program is not providing properly for targeted vulnerable group of households. The study conducted by the Ethiopian Development Research Institute (EDRI) (2018) on targeting social transfers in pastoralist societies supports this result stating that 'in the lowland regions of Afar and Somali wealthier households are more likely to benefit from the PSNP than

poorer household". Also EDRI (2018) confirms that in afar region nearly half of the poorest households were not selected for the PSNP in 2016, while 46 per cent of the richest were included.

Table4. 14: **Participation in pastoral safety net program**

PSNP	Household food security status						χ^2
	Secure(N=76)		Insecure(N=124)		Total(N=200)		
	Frequency	Percent	Frequency	percent	Frequency	percent	
Yes	54	71	87	70.16	141	70.50	0.0180
No	22	29	37	29.84	59	29.50	
Total	76	100	124	100	200	100	

Source: own survey, 2020

4.4.   The incidence, depth and severity of food insecurity in sampled households

The Foster-Greer-Thorbecke (FGT) indices adopted as a measure of food insecurity to measure the incidence, depth and severity of food insecurity based on food poverty line (2200kcal/day) per adult equivalent per day.

The results of FGT measures in the study area summarized in (**table 4.15**) revealed that in total sample households, the incidence of food insecurity (head count index), food insecurity gap and food insecurity severity are found to be 0.62, 0.18 and 0.071 respectively. This implies that about 62% of sampled households cannot meet the minimum energy requirement recommended for healthy and active life. The food insecurity gap was calculated to know how far the food insecure households are below the recommended daily energy requirement and also provides an opportunity to estimate resources required to eliminate food insecurity through proper intervention. The food insecurity gap was found to be 0.18 which referred to the amount of energy necessary to bring everyone from below recommended daily caloric requirement to the minimum recommended daily caloric requirement cut off point. This means that the administration of Awsa zone (zone1) should mobilize resources equal to about 18% of the caloric needs of every food insecure household and distribute it to every household in the amount required so as to bridge the food gap under the assumption of perfect targeting then, theoretically, food insecurity could be eliminated. In other

word, on average 396 kcal per adult equivalent is required to lift the food insecure to the level of recommended daily caloric requirement. Moreover, Severity of food insecurity measures the extent of the inequality in levels of food insecurity among the food insecure groups, at the same time it measures the food insecurity gap between household. In this study the severity of food insecurity, for the most food insecure households was found to be 7.16% percent.

Table4. 15: **summary statistics of FGT index values**

FGT indices	Indices value
Head count ratio (P_0)	0.62
Food insecurity gap (P_1)	0.181
Squared Food insecurity gap(P_2)	0.0716

Source: Own computation, 2020

FGT indices result varied across districts and Kebelles in the study area. As presented in **Table4. 1**6 large proportions (63.5%) of sampled households from Dubti could not get the required minimum energy recommended and the food insecurity incidence in Aysaita was 60%. The food insecurity gap is 17.87% and 18.52% in Dubti and Aysaita respectively, implying no such significance difference between these sampled districts in terms of food insecurity gap. The severity of food insecurity is 6.83% in Dubti and 7.53% in Aysaita. Among the sampled kebeles sekoyta has the highest level of food insecurity (74.2%), followed by Geega (58.8%) and Gahirtu and galifage (58.06%) respectively. The lowest headcount index was recorded in Barga (57%), followed by Unda buri (57.8%). The highest food insecurity gap is recorded in Barga kebele which is 19.39% followed by sekoyta 18.73%. The lowest food insecurity gap is also found in Gahirtu and Galifage kebeles which is 14.83%. There is also disparity in food insecurity level among pastoral and agro Pastoral households. The head count ratio for pastoral households was 0.6562 which implies 65.56% of pastoral households were food insecure and for agropastoral households was 0.5555 meaning 55.55% of agro pastoral households could not meet the minimum daily required calorie level.

Table4. 16: **Incidence and severity of food insecurity across districts and kebeles**

		Indices value		
		P0	P1	P2
Districts	Dubti	0.6355	0.1787	0.0683
	Aysaita	0.6021	0.1852	0.0753
	Geega	0.5882	0.1711	0.0685
	Sekoyta	0.7428	0.1873	0.0638
	Unda buri	0.5789	0.1777	0.0724
Kebelles	Barga	0.5714	0.1939	0.0876
	Gahirtu	0.5806	0.1483	0.0512
	Galifage	0.5806	0.1483	0.0512
Livelihood	Pastoralists	0.6562	0.1405	0.0844
	Agro pastoralists	0.5556	0.1750	0.0708

Source: Own computation, 2020

4.5. Determinant Factors that Affect the Household Food insecurity

This section presents and discusses empirical findings of econometric model result and interpretations of significant explanatory variables. Binary logistic regression model was employed to identify demographic, socio-economic and institutional factors that can determine food security of households in the study area.

Before going to the regression model heteroskedasticity, multicollinearity, endogeneity, and normal tests were conducted. These tests indicated that there was no serious econometric problem that would lead to biased estimation. In addition the goodness-of-fit tests were undertaken to check whether the model fits the data well. The Log likelihood ratio (LR) test was used and the result reveals the chi-square of 30.83 with p-value of (0.0003). This means that $\chi2$ is statistically significant and the model fits the data well. The Pseudo R^2 of the model is also 0.1560. This approves that the model has a good fit to the data and explained significant non-zero variations in factors influencing food insecurity.

Overall, the estimated model correctly predicted 70.5% of households to fall into the actual category. The sensitivity, correctly predicted food insecure is 83.87% and that

of specificity, correctly predicted food secure is 48.68%. This indicates that the model has estimated the food insecure and food secure correctly.

According to the logistic regression model outputs presented in table **4.17** among thirteen (13) explanatory variables included in the model seven variables (sex of household head, marital status of household head, literacy status of household head, family size per adult equivalent, livestock holding, cultivated land size and food aid received are statistically significant variables affecting food insecurity status of households in the study area. Sex of household head, marital status, literacy level, livestock holding, cultivated land size and food aid negatively affecting household food insecurity while family size per adult equivalent positively affecting household food insecurity. The signs of all explanatory variables were as expected.

The variable significantly affected households' probability of being food insecure at different probability levels. Marital status and cultivated land size is significant at 1% probability level, while sex and family size affects at less 5% probability level and literacy level, food aid and livestock holding significantly affects at less than 10% probability level.

The age of household head(AGE), dependency ratio(DR), distance from near market place (DMKT), nonfarm (off farm) income (NONFARM), access to credit service (CREDIT) and participation in pastoral safety net program (PSNP) were not important predictors of the food insecurity status of households in the study area. The statistical non significance of these variables suggests that they are not important with regard to explaining the food insecurity status of sampled households.

Table4. 17: **Estimation result of binary logit model**

FODINS	Coefficient	Std. Error	Z value	P > |z|	Marginal Effect dy/dx
SEX	-1.129039	0.5342246	-2.11	0.035**	-0.2219404
AGE	0.0134786	0.0160478	0.84	0.401	0.003074
EDU	-0.1689334	0.0916721	-1.84	0.065*	-0.0385277
MARITAL	-1.080245	0.353724	-3.05	0.002***	-0.2463655
FAMAD	0.2167967	0.1002524	2.16	0.031**	0.0494436
DR	0.1360585	0.1804529	0.75	0.451	0.0310301
TLU	-0.0258534	0.0144392	-1.79	0.073*	-0.0058962
LND	-1.053707	0.3725911	-2.83	0.005***	-0.2403131
MKT	0.0208126	0.0727856	0.29	0.775	0.0047466
NONFARM	-0.0000481	0.0000558	-0.86	0.389	-0.000011
CREDIT	0.3000721	0.428769	0.70	0.484	0.0664642
PSNP	-0.3733974	0.4359911	-0.86	0.392	-0.0829772
AID	-0.6902589	0.4781665	-1.44	0.094*	-0.1471683
Kebelles(Undaburi kebele was taken as bench mark)					
Gahirtu	-0.8585859	0.6478926	-1.33	0.185	-0.2055242
Geega	-1.885598	1.056275	-1.79	0.074*	-0.4393176
Barga	-2.113719	1.062242	-1.99	0.047**	-0.4828803
Galifage	-1.509181	1.067853	-1.41	0.158	-0.3600001
Sekoyta	1.581825	1.085599	1.46	0.045**	0.3753016
CONS_	5.390007	1.802822	2.99	0.003	--
LR chi^2(9)					30.83***
Prob > chi2					0.0003
Pseudo R^2					0.1560
Log likelihood					-112.09
Sensitivity					83.87%
Specificity					48.68%
Percent correctly predicted (Count R^2)					70.50%

Note: *, **and * significant at 1%, 5% and 10% probability levels respectively**

Source: Binary logistic regression model output, (2020).

4.5.1. Analysis of significant variables

Sex of Household head (SEX): This variable is found to have negative relationship with food insecurity and significant at less than 5 percent probability level. The negative sign is an indicative that male headed households were less likely to be food insecure than female headed households. The marginal effect shows that other factors remaining constant, the probability to be food insecure decreased by 22.2% for male headed households than households headed by female. The possible reason could be that in insight of the strong customary tradition the social position of men in the pastoral and agro pastoral community is more powerful as compared to women and have better access to different factors that determine food insecurity and build adaptive capacity such as wealth ownership, wealth inheritance, opportunities to com munity level participation and have more access to productive resources like cultivated land. In the study area livestock and farming was the main production activities which require higher physical capacity and takes a lot time so, men are more likely to engage in this work because they are stronger and more physically fit than women. In addition to this fact, with their heavy burden and additional responsibilities inside their home and other economic activities; women have less control over the major livestock types (cattle and camels) and farming; their role is limited to small ruminants (goats and sheep). So, male-headed households are in a better position in terms of food security than the female headed ones. This is consistent with the findings of Idris (2013) and Teklay et.al (2015).

Literacy of household head (EDU): This variable is significant at less than 10 percent probability level and negatively associated with household food insecurity. The negative sign shows that households headed by educated person is less likely to be food insecure than those headed by illiterate. The marginal effect shows that other things remain constant the probability of being food insecure decreased by 3.85% for households with a formally educated head as compared to those who had no formal education. The possible explanation is that household head education largely contributed to work efficiency, competency, income diversification, adopting modern technologies with long term target to make sure better living condition than illiterate ones. This is due to educated household head plays a significant role in shaping house hold members. Thus, being literate reduces the chance of becoming food insecure in

the sample households. This result is consistent with the findings of Girma (2012); Teklay et.al (2015) and Mohamed (2016).

Marital status of household head (MARITAL): This variable is significant at less than1 percent probability level and negatively affects household food insecurity. The negative sign implies that married couples were less likely to be food insecure than households headed by unmarried heads. The marginal effect shows that other things remain constant the probability of being food insecure decreased by 24.63% for households with married heads than households with unmarried household head. The possible reason may be that in Afar community new married households given different gifts (livestock, money and kind) from families, relatives and friends this may enables them to accumulate wealth and become self reliance. Further, it may help them to become food secure. Another reason may be that married household heads pay full attention to fulfill their necessary needs and wants and are better in utilizing resources than others. This result is inconsistent with the findings by Tshediso (2013) who reported that the marital status of the head of household was negatively associated with household food security in indication that household food security for married respondents is relatively less than their unmarried counterparts.

Family size per adult equivalent (FAMAD): Consistent with the hypothesis, family size (AE) has a positive influence on household food insecurity and significant at less than 5 percent probability level. In other words, it is to mean that as family size increases, the probability of being food insecure also increases marginally, holding other things remaining the same. As marginal effect shows other factors remain constant as family size increases one more adult equivalent the probability to be food insecure increased by 4.94% for a given household. The reason is that in an areas where households economy depends on less productive livestock production with fewer crop production and limited off-farm employment activities, increase in household size increases pressure on food consumption that may not be matched with the existing food supply leads to become food insecure.

Livestock holding (TLU): As hypothesized and expected, Livestock holding weighted by tropical livestock unit (TLU) exerts a negative impact on the status of food insecurity for the pastoral and agro pastoral households and significant at less than 10% level of probability. The negative relationship indicates that an increase in

number of livestock owned decreases the probability to be food insecure for a given household. As marginal effect shows that other things being constant, a one unit increase in number of livestock owned decreases the probability of being food insecure by 0.6%. The possible explanation is the fact that, households with large number of livestock expressed in tropical livestock unit had better chance to produce more milk, milk products and meat for direct consumption at times of deficit. In addition households own large livestock number earns more income from livestock production, this in turn helps them to buy foods when they faced shortage. Specifically, for pastoral and agro pastoral household's livestock holding plays a vital role to build Shock-absorbing capacity. A similar result was also obtained by Indris (2013); Misgina (2014); (Mohammed (2016); and Ahmed et.al (2018).

Cultivated land size (LND): This variable had negative influence on food insecurity status of households and strongly significant at less than 1% probability level. The negative relationship implies an increase in size of cultivated land decreases the probability to be food insecure. The marginal effect indicates that, other factors remain constant; a one hectare increase in land size decreases the probability of households to be food insecure by 24.03%. The possible explanation is that households owned large cultivated land had a better chance to produce more for household consumption and for market purpose, to generate income from sale of crop product and to diversify crop they produce which in turn enables them to be food secure than those having relatively small size of cultivated land and with no cultivated land. This result is supported by Abebaw (2003) and Mequanent (2010).

Food aid (AID): As it was hypothesized food aid significantly and negatively affect house hold food insecurity at less than 10% probability level. Negative sign is an indicative that households received food aid was less likely to be insecure. Marginal effect shows that, other variables remain constant; the probability to be food insecure was decreased by 14.71% for households received food aid than households did not receive. The possible reason is that in the areas affected by recurrent drought with chronic food insecurity food aid play a life saving role and improves many people's lives. Specially, it has tremendous help in times of emergencies caused by natural disasters. Moreover, food aid prevents household from losing their assets, creates temporary job opportunity for distributers and changes their consumption patterns. Besides this positive impact, different studies (Madziakapita, 2008; Asenso-Okyere

et.al, 2013 and Hamedu, 2013) found that food aid is a disincentive which creates laziness, develops dependency syndrome and reduces local food production since the source of food it offers easier to come by than that by production. This situation was happened in the study area and many respondents acknowledged it.

The status of food insecurity is also influenced by geographic variable. The disparities across Kebelles are important determining factors in the prevalence of food insecurity in the pastoral and agro-pastoral communities of awsa zone. In comparison to Unda buri kebele, Geega and Barga Kebelles are less likely to be food insecure while sekoyta kebele is more likely to be food insecure, or more accurately the probability of being food insecure is greater. This might be associated with the particular nature of the kebele, and with various factors that can enhance people's livelihoods and improve the productivity of households. The main factors here are the infrastructural arrangements, the particular economic activities of the kebele and the accessibility of different utilities and services.

4.6.   Food insecurity coping strategies of households

Table4.13 below presents the types of coping strategies adopted by pastoral and agro pastoral households in the study area as identified by focus group discussion during the survey period.

Among 200 respondent households 127 (63.5%) was reported borrowing of food or cash from neighbors and relatives as the first and mostly used coping mechanism followed by Sell of livestock more than usual 114 (57%) and Shifting to less preferable and cheap food 113 (56.5%) respectively. The fourth, fifth and sixth mostly used coping mechanisms by large number of households are reliance on relief assistance (51.5%), Sale of fire wood, wood for construction and charcoal(51.5%) and Selling household assets((50.5%). Another important activities that household used as a coping mechanism in the study area include; reducing number of meals eaten in a day, dropping children out of school, migrating to another place, slaughtering small animals for consumption, exchange small animals to cereals and eating of wild fruits and plants for food which about 47.5%, 47%, 36.5%, 34%, 33%, and 13.5% respectively.

The most severe coping mechanisms which could have a long term negative effect on the food security status of households in particular and the entire society in general were dropping children out of school, sale of fire wood, wood for construction and charcoal, selling household assets, slaughtering small animals for consumption and exchange small animals to cereals. Dropping children to solve temporary food deficit will ruin the future chances of the youngsters and also reduces the future human capital resource of the society in particular and the country in general.

Sale of fire wood, wood for construction and charcoal to solve the short term problem of food shortage may exacerbate the harsh climate condition, results environmental damage and soil erosion. This in turn may further intensify the existing problem of food and make the region more prone to continuous drought.

Table4. 18: **Most commonly used coping mechanisms**

Coping strategies	Food security status			
	secure	insecure	Total	
	%	%	Freq	%
Sell of livestock more than usual	36.8	63.2	114	57
Borrowing of food or cash from neighbors	37	63	127	63.5
Sale of fire wood, and charcoal	40.7	59.3	103	51.5
Reducing number of meals eaten in a day	42	58	95	47.5
Selling household assets	33	67	101	50.5
Exchange small animals to cereals	31.8	68.2	66	33
Slaughtering small animals for consumption	44	56	68	34
Migrating to another place	56.6	43.4	73	36.5
Eating of wild fruits and plants for food	14.8	85.2	27	13.5
Reliance on relief assistance	39.8	60.2	103	51.5
Shifting to less preferable and cheap food	36.3	63.7	113	56.5
Dropping children out of school	36	64	94	47

Source: Own survey data, 2020

The coping strategy index result summarized in (**Table4. 19**) shows the mean values of CSI for food secure and food insecure households in the study area were found to be 19.31 and 29.91 respectively. The higher is the value of coping strategies index the

more food insecure the household is and vice versa.

The mean comparison test (t = 5.0388) with (prob>t=0.0000) reflects the existence of statistically significant mean difference at 1 percent significant level. Hence, it can conclude that the type of coping strategy used by food secure and insecure groups is significantly different in the study area.

Table4. 19: Summary statistics of coping strategy index

Food security status	Coping strategies		t-statistics
	Mean	Standard deviation	
Food secure	19.31579	14.24566	
Food insecure	29.91935	14.56558	t = -5.0388***
Total	25.89	15.30487	

Note: * shows the mean difference is significant at 1 percent probability level.**

Source: Own survey data, 2020

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. SUMMARY

The study examined the food insecurity status of pastoral and agro pastoral households in afar region Awsa zone, Ethiopia. The FGT indices were used to measure the incidence depth and severity of household food insecurity and a binary logistic regression model was used to determine the factors influencing household food insecurity. Data from a sample of 200 households in two districts of awsa zone was analyzed, with the food insecurity status (1 = food insecure and 0 =food secure) as the dependent variable and a number of demographic characteristics, socio-economic and institutional factors as explanatory variables. The minimum daily subsistence requirement in adult equivalent of (2,200 Kcal) determined by Ethiopian Health and Nutrition Research Institute (EHNRI) were used as a cut-off point to separate food secure and insecure of sampled households. 62% of the sampled households were found to be food insecure and 38% were food secure.

The demographic and socio-economic characteristics influence food insecurity in the study area. The majority of household heads in the study area are mostly male (82.5%) and married to a wife (83.5%). The average family size is 5. 59% of household heads do not have any form of education in the study area. The average livestock holding and cultivated land size is 11.96 and 0.62 respectively. The mean annual income of households is 10834.81 birr and the average distance from nearest market centre is around 5 hours. Regarding the credit service, pastoral safety net participation and food aid status the results showed that 20.5% of sampled household have access to credit, 70.5% are participants of safety net program and 76.5% of respondents received food aid.

The result from FGT indices revealed that the incidence, depth and severity of food insecurity are found to be 62 percent, 18 percent and, 7.16 percent respectively.

 Among thirteen (13) explanatory variables included in the model seven variables (sex of household head, marital status of household head, educational level of household head, family size per adult equivalent, livestock holding cultivated land size and food aid received are statistically significant variables affecting food insecurity status of households in the study area.

Sex of household head negatively associated with household food insecurity. Male headed household are found to be much more food secure than that of female headed household. This is due to cultural labor division aspects in the community males have more chance to involve in more productive economic activities. Educational level of household head negatively affect food insecurity status with the implication that educated heads have much more chance to engage in different income generating activities and effectively manage their resource. The Marital status of the household head was significant, although it had negative sign implying that that married couples were likely to be more food secure than single headed households. Larger family sizes are associated positively with food insecurity status. Larger family sizes require increase food expenditure and competition for limited resources. Livestock holding measured in TLU also negatively related with food insecurity. The reason is households with large number of livestock could produce more livestock products for household consumption and could generate more income from sale of livestock and livestock products. Moreover, food aid received was significant and negatively associated with food insecurity status. Food aid is served as a source of sustenance for many poor households in the study area.

Finally, the coping mechanisms commonly used by pastoral and agropastoral households are identified. Large number (63.5%) of respondent households was used borrowing of food or cash from neighbors and relatives as coping mechanism followed by Sell of livestock more than usual (57%) and shifting to less preferable and cheap food (56.5%) respectively. The most severe coping mechanisms used by households in the study area which could have a long term negative effect on the food security status of households in particular and the entire society in general were dropping children out of school, sale of fire wood, wood for construction and charcoal, selling long lasting household assets, slaughtering small animals for consumption and exchange of small animals to cereals.

5.2. CONCLUSION

Food insecurity is more worrisome now than ever before due to the unprecedented variability of the climate and the poverty trap that the people are in. The findings obtained from the study revealed that food insecurity continues to affect the pastoral and agro pastoral households in afar region. The study has found the majority 62% of the households are food insecure through the use of household calorie intake method. These food insecure households could not cover the required daily food from the income generated from their major activity of subsistence agriculture and nonfarm activities both in quality and quantity. The food insecurity situation of the study area is extremely difficult and alarming and needs an urgent response.

The demographic and socio-economic characteristics of the households were found to be important correlates of food insecurity. Households with large family size, non-educated and female household heads are more likely to be food insecure than those with smaller family size, educated and male household heads. Similarly low land size, not livestock, low nonfarm income are significantly associated with food insecurity. The FGT based measures reveal that the food insecure became even more insecure and the food insecurity gap and severity increased for those at the intense levels.

The results of the binary logistic regression confirm that the among the variables included in the model sex of household head, marital status of household head, and literacy of household head, livestock holding (TLU) cultivated land size and food aid received had a negative influence on food insecurity status of households, while other variable of significance, namely family size (AE), were found to exert a positive impact on food insecurity in the study area.

Since the majority of the population in the study area practices pastoralism, keeping livestock safeguard households from drought and other shocks, raise the ability of households to meet social obligations and enhance cultural identity. Livestock for pastoral and agropastoral households is a financial, social and capital asset with careful tending its improvement can drive households out of poverty in general and food insecurity particular. Moreover, household heads education, the influence of cultivated land size and food aid in particular, and aspiration for change and wealth should be considered as they had moderate effect on food insecurity. Thus, it can be conclude that factors from demographic and socioeconomic ones determined the food insecurity of households in the study area.

5.3. POLICY RECOMMENDATIONS

The result of this study shows that 62% of the sampled households were unable to get the minimum daily calorie requirement. Even if limited in scope and with a lot of questions remaining unanswered, In order to improve households' food security situation in the area, this study has come up with results which have important policy implications.

- Large family size is a problem for the household when dependent members are high. The first task to solve this problem should be creation of offarm employment opportunities in order to enable household members to generate income from different sources and to ensure food security. In addition, households should be educated on the need to adopt family planning techniques by the organizations working on the health stream in the strategic approach. Since the communities in the study area are Muslim, natural birth control and other alternatives should be assessed carefully taking in to account the cultural and religious aspects of family planning facilities.

- Education is important to increase the quality of live standard among the households. As this study show 59% of household heads are illiterate. This points the need to give unique attention for expanding education access in the areas. The educational demand of the pastoralist communities cannot meet simply with availability of access to formal education. Majority of the community move from one place to another in search of pasture and water for their livestock and also they frequently travel with their livestock as it is the major source of food and income for them. Hence, to meet educational demand of those frequently travelling pastoralist children, mobile schools that can easily move with the pastoralist and provides educational service for the children should be provided and developed.

- Livestock sector development should also be a priority to help alleviate food insecurity since households economy in the study area heavily relied on livestock either through direct consumption or generate income from its products. In this regard, livestock development packages must be introduced and promoted to enhance the production and productivity of the livestock sector through the provision of improved water supply points, introduction of new breads and upgrade the existing ones, establishing effective and sustainable forage

development program, launching of training centers for the livestock holders on how to improve their production and productivity, providing effective veterinary services and marketing conditions should be improved.

- Cultivated land is an important factor in improving household food insecurity. As discussed above agro pastoralists who engaged in small farming activities are less food insecure than pastoralists. Unlike other areas in Ethiopia there are vast uncultivated lands but people's interest to engage in crop production and other farming activities is limited in the study area. In this regard awareness creation is highly required to attract pastoral households in to crop production and recover them from drought prone livelihood activities. In relation to this, necessary effort is required to enhance crop production and productivity through using land saving technologies, expanded access to land in the form of land redistributions and provision of credit access.

- The study showed food aid was serving as sustenance of life in the study area. Despite this, direct food aid and grants encourages laziness, develops dependency and reduces local food production. So, government and donor partners working in food aid grant and distribution are advised to provide aids (food or in kind) in a way that could be assisted households to fully stand on their own and it should be granted discriminately for targeted food insecure group of households.

- Moreover, The Government together with its development partners should plan and implement a long term and sustainable solutions and design welfare monitoring system for the pastoral and agro pastoral communities in order to reduce the existing high level of food insecurity.

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Appendices

Appendixes table 1: Conversion Factor used to calculate Adult Equivalent (AE)

Age category (Years)	Sex	
	Male	Female
<10 years	0.60	0.60
10-13	0.90	0.80
14-16	1.00	0.75
17-50	1.00	0.75
<50	1.00	0.75

Source: Storck, et al. (1991)

Appendixes table 2: Conversion Factor for Tropical Livestock Unit (TLU)

Animal Category	TLU
Calf	0.50
Weaned Calf	0.34
Heifer	0.75
Cow	1.00
Ox	1.00
Donkey (adult)	0.70
Donkey(young)	0.35
Camel	1.25
Sheep & goat(young)	0.13
Sheep & goat(young)	0.06
chicken	0.013

Source: Storck, et al. (1991)

Appendixes table 3: Conversion factor for kilocalories per kilogram of different food types

Food item	Unit	Mean kcal per kilogram
Wheat	Kg	3623
Maize	Kg	3751
Barely	Kg	3723
Rice	Kg	3330

Teff	Kg	3589	
Sorghum	Kg	3850	
Pasta	Kg	3550	
Peas	Kg	3553	
Lentils	Kg	3522	
Onion	Kg	713	
Tomato	Kg	216	
Sweet potato	Kg	1360	
Berbere	Kg	933	
Meat	Kg	1148	
Milk	Liter	737	
Butter	Liter	7364	
Sugar	Kg	3850	
Salt	Kg	1700	
Oil	Liter	8964	
Egg	Each	61	

Source: EHNRI (2000)

Appendix table 4: Logistic regression result

Iteration 0: log likelihood = -132.81283
Iteration 1: log likelihood = -112.56082
Iteration 2: log likelihood = -112.09275
Iteration 3: log likelihood = -112.09181
Iteration 4: log likelihood = -112.09181

Logistic regression

Number of obs = 200
LR chi2(18=)   41.44
Prob > chi2=   0.0013

Log likelihood = -112.09181

Pseudo R2   = 0.1560

insecure	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
sex	-1.129039	.5342246	-2.11	0.035	-2.176101	-.0819784
age	.0134786	.0160478	0.84	0.401	-.0179744	.0449317
edulevel	-.1689334	.0916721	-1.84	0.065	-.3486074	.0107406
marital	-1.080245	.353724	-3.05	0.002	-1.773531	-.3869585
famade	.2167967	.1002524	2.16	0.031	.0203055	.4132879
DR	.1360585	.1804529	0.75	0.451	-.2176228	.4897397
tlu	-.0258534	.0144392	-1.79	0.073	-.0541537	.0024469
Clsize	-1.053707	.3725911	-2.83	0.005	-1.783972	-.3234417
nonfarm	-.0000481	.0000558	-0.86	0.389	-.0001573	.0000612

dsmrkt	.0208126	.0727856	0.29	0.775	-.1218444	.1634697
credit	.3000721	.428769	0.70	0.484	-.5402997	1.140444
psnp	-.3733974	.4359911	-0.86	0.392	-1.227924	.4811295
aid	-.6902589	.4781665	-1.44	0.149	-1.627448	.2469301
Gahirtu	-.8585859	.6478926	-1.33	0.185	-2.128432	.4112603
Geega	-1.885598	1.056275	-1.79	0.074	-3.955859	.1846636
Barga	-2.113719	1.062242	-1.99	0.047	-4.195674	-.031763
galifage	-1.509181	1.067853	-1.41	0.158	-3.602135	.583773
sekoyta	1.581825	1.085599	1.46	0.145	-3.709559	.5459098
_cons	5.390007	1.802822	2.99	0.003	1.856541	8.923472

.mfx

Marginal effects after logit

   y = Pr (insecure) (predict)

   = .64810637

Variable	dy/dx	Std. Err.	z	P>|z|	[95%	C.I.]	X
sex*	-0.2219404	0 .08445	-2.65	0.008	-0.389727	-0.05868	.825
age	0.003074	0 .00339	0.70	0.486	-0.00428	0.00900	40.505
Edulevel*	-0.0385277	0.02076	-1.97	0.049	-0.081639	0.00025	1.335
Marital*	-0.2463655	0.07847	-2.95	0.003	-0.38509	0.077495	2.145
famade	0.0494436	0.02134	2.01	0.044	0.001166	0.084812	4.96895
DR	0.0310301	0.04009	1.36	0.173	-0.02392	1.3791	0.133248
tlu	-0.0058962	0.00298	-2.23	0.026	0.012502	0.00080	11.8702
Clsize	-0.2403131	0.0357	-3.18	0.001	-0.183484	0.043538	0.72495
nonfarm	0.0047466	0.00001	-0.32	0.745	-0.000023	0.000016	2669.11
dsmrkt	-0.000011	0.01004	-0.21	0.835	0.02177	0.017592	5.0525
credit*	0.0664642	.09065	0.55	0.580	-0.127516	0.205	0.227819
psnp*	-0.0829772	.0928	-0.61	0.540	-0.238712	0.125049	0.705
aid*	-0.1471683	.08837	-1.88	0.061	-0.339002	0.765	0.007395

 (*) dy/dx is for discrete change of dummy variable from 0 to 1

Appendix 5: Diagnostic tests

estat classification

Logistic model for insecure

Classified	-------- True -------		Total
	D	~D	
+	104	39	143
-	20	37	57
Total	124	76	200

Classified + if predicted Pr (D) >= .5

True D defined as insecure! = 0

Sensitivity	Pr(+ D)	83.87%
Specificity	Pr(-~D)	48.68%
Positive predictive value	Pr(D +)	72.73%
Negative predictive value	Pr(~D -)	64.91%
False + rate for true ~D	Pr(+~D)	51.32%
False - rate for true D	Pr(- D)	16.13%
False + rate for classified+	Pr(~D +)	27.27%
False - rate for classified-	Pr(D -)	35.09%
Correctly classified		70.50%

. **lrtest** e1 e2

Likelihood-ratio test   LR chi2(9) =   30.83

(Assumption: e1 nested in e2)   Prob > chi2 =   0.0003

.Hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

   Ho: Constant variance

   Variables: fitted values of insecure

   chi2 (1)   =   1.36

   Prob > chi2 =   0.2438

. Ovtest

Ramsey RESET test using powers of the fitted values of insecure

   Ho: model has no omitted variables

       F (3, 178) =   0.48

       Prob > F =   0.6938

. Vif

Variable	VIF	1/VIF
Clsize	4.67	0.214283
Geega	4.60	0.217474
sekoyta	4.58	0.218133
Barga	4.30	0.232368
galifage	3.90	0.256220
Gahirtu	2.12	0.472213
tlu	1.38	0.723328
famade	1.37	0.729158
psnp	1.37	0.730770
age	1.31	0.764028
aid	1.26	0.793864
marital	1.21	0.825078
sex	1.20	0.832117
nonfarm	1.19	0.839921
DR	1.19	0.841463
edulevel	1.12	0.892123
dsmrkt	1.11	0.903608
credit	1.11	0.903647
Mean VIF	2.17	

Appendix 6: Survey Questionnaire

COLLEGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

A Questionnaire developed for Research entitled "**Determinants of Household Food Insecurity among Pastoral and Agro Pastoral Communities in Ethiopia: Evidence From Afar Region (Awsa one)**"

Part One: General Information

1. Zone _____
2. Woreda: _____
3. Kebele _____
4. Village _____
5. Name of the enumerator _____
6. Date of interview _____

Part Two: Demographic characteristics of household

1. Name of household head(if have allow)_____
2. Sex of household head:_____ : 1= male 0=female
3. Age of household head (in years)_____
4. Relationship to household members: _____
    1 = Head   **2**= Wife/Husband   3**=** Son/daughter   **4** = Parent
    5 = Grandchild   **6**= Brother/sister   **7**= other relatives   **8**= Not related
5. Literacy status of household head: _____
    1= illiterate   2= read and/or write only   3=Religious education
    4= primary   5= Secondary   6=higher education
6. Marital status:_____ 1=single 2=married 3= divorced 4=widowed
7. Occupation (livelihood) ____1= Pastoral   2 = Agro pastoral 3 =other(specify)_____
8. Total number of family size (number)_____
9. Age distribution of family members(in number)
    1.   <10 years _____   4. 14-16 years _____
    2.   10-13 years _____   5. >50 years _____

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3. 17-50 years _____
10. Number of dependent household member's(number) _____

Part Three: Socio Economic and Demographic Factors

I: Livestock Ownership

1. Do you own livestock? _____ 1 = Yes 2 = No
2. If yes to question1, would you tell me the number of livestock you own at present?

Types of livestock	Currently owned in farm (number)	Equivalent in cash
Camels		
Cows		
Goats		
Sheep		
Calves		
heifers		
oxen's		
Donkeys		
Hen		
Others(specify)		

3. Do you get an income from the sale of the products of livestock in the last 12 months?____   1= Yes 2=No
4. If your answer is yes what is the total income that you get from the sale of the products of livestock in the last twelve months? _____
5. Why did you sell livestock this year? _____
    1. To avoid drought
    2. Purchasing other consumer goods
    3. For purchasing food
    4. For buying cloth
    5. Other (specify) _____
6. Which of the followings are the constraints to rearing livestock? (Multiple responses are possible)_____
    1. Shortage of grazing land
    2. Disease prevalence
    3. Lack of additional fodder
    4. Shortage of water
    5. Insufficient veterinary services

6. Attack by wildlife
7. Conflict on grazing land and water   **8**. Others (specify)_____

II: Land ownership

1. Do you have your own land for cropping and pasture?_____ 1=yes 2=no
2. If yes to question 1, what is the total size of your land (in hectare)? _____
3. What is the total area of land did you cultivated during last harvesting season in year 2019? ____ ___ (in hectare).
4. Do you think that your piece of land is enough to support your family? ___1=Yes 2=No
5. I f No, state your reason (multiple responses are possible)_____.
   1. Small size of land   3. Lack of agricultural inputs to increase productivity
   2. Exhausted land   4. Large family size   5. Others_____
6. How many times do you plant a year? _____ **1**. Once **2**. Twice **3**.Three times
7. How much of the following crops did you harvest during February 2019 to February 2020?

Types of crop	Area(in hectare) or local unit	Total production (in quintal or in kg)	Value in Birr
Barely			
Wheat			
Millet			
Sorghum			
Others			

8. Do you practice irrigation?_____ Yes = 1 No = 0
9. If yes to question 8 what is your irrigated land size(in hectare)_____

III: Marketing

1. Where do you buy food stuffs and non-food items (clothes and the like) for your household consumption? _____
2. 1. From nearby market   2. In any villages market   3. Other (specify) _____
3. How far is the market place from your residence? _____ Hours, _____Kms.
4. Distance of the nearest market place for selling and buying your livestock?_____

Classes of livestock	Place sale		Place of purchase	
	Name of market place	Distance in km or hours	Name of market	Distance in km or hours

			place	
1. Camel				
2. Cattle				
3. Goat				
4. Sheep				
5. Donkey				
6. Hen				

IV: Household Income

1. Do you or do any member of your family have off-farm (non-farm) job?___ 1=Yes 2=No

2. If yes, would you tell us about the types of activities and amount of income from the job?

	Types of job	Monthly earned(in birr)
1		
2		
3		
4		
5		
6		
7		
8		
9		

3. Has the household received remittance in the last 12 month? _____1=yes 2=no.

4. If yes for Q3, how much you receive? _____

V: Food aid received

1. Have you (your household members) received food aid during the last 12 months? _____ 1=Yes 2=No

2. if yes for Q1, please indicate the type and amount received

Type of aid items received	Unit	Amount received	Equivalent in cash
wheat	Kg		
Sorghum	Kg		
Edible oil	Litre		
Hand tools (specify)			
Others, specify			

3. Since when did you use to receive food aid? Since 20_____

4. Is the amount of aid the same or what? 1= Increasing 2= Decreasing 3= No change.

VI: Credit Services

5. Have you received any type of credit for the last 12 months? _____ 1. Yes 2.No
6. If yes, for what purpose did you take the credit? _____
7. What is your source of credit, please? _____
   1. Bank   4. Local money lenders
   2. NGO's   5. Friends and relatives
   3. Micro finance institutions   6. Traders   7. Other, specify _____

VII: Extension service

1. Has your household received any type of extension from any government and/or nongovernment organizations?_____ 1=Yes, 0 = No
2. If yes, to Q1 what are the extension services received?   1. Training 2. Crop protection
    3. Agronomic practice   4. Others_____
3. Have you participated in the agricultural extension package program? 1=Yes, 0 = No
4. If yes to Q3 for how long? ____months, ____Years.

XIII: Access to animal health services

1. Do you get veterinary services for your animals? _____ 1=Yes   0=No
2. If no, where do you take animals when they get sick? _____
   1. To traditional healer   4. Give medicinal plants
   2. Buy Drugs from where it is available   5. Slaughter
   3. Take to nowhere & pray for it and eat   6. Others (specify) _____
3. If you treat with drugs, where do you get or buy vet. Drugs?_____
   1. Veterinary clinic   3. Open markets/shops
   2. Community based animal health workers (paravets)   4. Others (specify) _____

IX. Safety Net Participation

1. Did you (Your family member) participate in the productive safety net program? __1=yes 0=No
2. In which benefit package you participate? _____ 1. Direct support   2. Public work
3. How much benefit you and your family got from this intervention project in the previous 12 months? In birr. _____
4. If you participate in the public work package how much day participate in the previous one year? _____
5. If you participate in the public work package how much hour work in a day? _____

6. Are you satisfied with Public work?   1=Yes 0=No
7. Are you satisfied with direct support? 1=Yes   0= No

Part Four: Household Consumption Expenditure

1. Household consumption during the last seven days (considering both home and outside of home situation). (Here, wife and/or the person involved in purchases and preparing the meal should be the principal respondent/s).

Food type		Source			
Foods Staple	Unit	Home produced	Purchased	Gift/ loan/ wage in kind	Total consumed
Cereals					
Wheat					
Maize					
Sorghum					
Rice					
Teff					
Barely					
Pasta					
Macaroni					
Peas					
Lentils					
Animal product					
Milk					
Meat					
Butter					
Egg					
Fats, oils &others					
Edible oil					
Sugar					
Salt					
Others					
Vegetables					
Potato					
Pepper					
Garlic					
Onion					
Tomato					

Unit example: Kg, Liter, Packet, bundle

Part Five: Coping Strategies/Mechanisms

What coping mechanisms do you use when you have food shortage at your home to have enough food? Rank the given option according to how you prioritize them.

	Coping strategies	1. Yes 2. No	How often you do this Number of days out of the past 30 days(Use numbers 0 – 30)
1	Sell of livestock more than usual		
2	Borrowing of food or cash from neighbors and relatives		
3	Sale of fire wood, wood for construction and charcoal		
4	Reducing number of meals eaten in a day		
5	Selling household assets		
6	Exchange small animals to cereals		
7	Slaughtering small animals for consumption		
8	Migrating to another place		
9	Eating of wild fruits and plants for food		
10	Reliance on relief assistance		
13	Shifting to less preferable and cheap food		
12	Dropping children out of school		