

**MAGNITUDE AND DETERMINANTS OF PASTORAL HOUSEHOLDS
FOOD INSECURITY: THE CASE OF DEGAHBOUR DISTRICT OF
SOMALI REGIONAL STATE, ETHIOPIA**

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ABDIHALIM AHMED ISMAIL

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HARAMAYA UNIVERSITY, HARAMAYA

**Magnitude and Determinants of Pastoral Households Food Insecurity: the
Case of Degahbour District of Somali Regional state, Ethiopia**

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ABDIHALIM AHMED ISMAIL

**August 2017
Haramaya University, Haramaya**

HARAMAYA UNIVERSITY
POSTGRADUATE PROGRAM DIRECTORATE

As Thesis research advisor, I, hereby certify that I have read and evaluated this thesis entitled, **Magnitude and Determinants of Pastoral Households Food Insecurity: the Case of Degahbour District of Somali Regional state, Ethiopia**, prepared under my guidance, by Abdihalim Ahmed, I have recommended that can be submitted as fulfilment of the thesis requirement.

Bosena Tegegne (PhD)

Major Advisor

Signature

Date

Lemma Zemadu (PhD)

Co-Advisor

Signature

Date

As member of the Board of Examiners of the Final M.Sc. Thesis Open Defense Examination, we certify that we have read and evaluated the thesis prepared by Abdihalim Ahmed, entitled **Magnitude and Determinants of Pastoral Households Food Insecurity: the Case of Degahbour District of Somali Regional state, Ethiopia**, and examined the candidate. We recommended that the thesis is accepted as fulfilling the thesis requirement for the degree of Master of Science in Agriculture (Agricultural Economics).

Chairperson

Signature

Date

Internal examiner

Signature

Date

External examiner

Signature

Date

DEDICATION

I dedicate this thesis manuscript to my beloved wife Aisha Mohamad Mohamoud for her devoted partnership in the success of my life and my children Hanad, Aziza, Mohamaddek, Ahmednour, Umalkhayr, Abas, Tasnim and Rayan for their affection and love.

STATEMENT OF THE AUTHOR

By my signature, I declare that this thesis is my genuine work and that all sources of materials used for this thesis have been properly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for an advanced M.Sc. degree at Haramaya University in Agricultural Economics and is deposited at the University Library to be made available to users or borrowers under the rules of the Library. I confidentially declare that this thesis has not been submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate.

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Name: Abdihalim Ahmed

Signature: _____

Date of Submission: _____

Place: Haramaya University, Haramaya

BIOGRAPHICAL SKETCH

The author was born in Degahmado town of Degahmado district in Jarar zone of Ethiopian Somali Regional State (SRS) in December 1976. He joined college of commerce of Addis Ababa University in November, 1999 through distance learning under the auspices of Ethiopian management development program with monitoring and moderation of Open University business school of United Kingdom and completed with professional certificate and diploma in management in October, 2000 and July 2005 respectively. He joined Jigjiga University faculty of Business and economics, in 2007/08 and graduated with a BA degree in Economics in February, 2011. After graduation he was employed as a finance and logistics, planning, monitoring and evaluation process owner of SRS bureau of finance and economic development and served for four years. From 2013 up to now, the Author has been working as a deputy Bureau Head of Ethiopian Somali Regional State Water Resource Development Bureau. He joined the Post Graduate Program of Bahir Dar University regular program in 2014 and graduated with MSc degree in Disaster Risk Management and Sustainable Development in July 2016. He also joined the School of Graduate Studies of Haramaya University Continuing Education Program in 2012 to pursue his MSc Degree in Agricultural Economics.

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LIST OF ABBREVIATIONS AND ACRONYMS

ADLI	Agricultural Development Led-Industrialization
AE	Adult Equivalent
ANRS	Afar National Regional State
ATA	Agricultural Transformation Agency
ATPS	African Technology policy studies network
BoFED	Bureau of Finance and Economic Development
CAADP	Comprehensive African Agriculture Development Programme
CSA	Central Statistical Agency of Ethiopia
CSI	Coping Strategies Index
DDAO	Degahbur District Agricultural Office
DHS	Demographics and Health Surveys
DPPC	Disaster Prevention and Preparedness Commission
DPPB	Disaster Prevention and Preparedness Bureau
DPPA	Disaster Prevention and Preparedness Agency
EFA	Entitlement Failure Approach
EC	European Commission
EFSRA	Emergency Food Security Reserve Administration
EGS	Employment Generation Schemes
EHNRI	Ethiopian Nutrition and Health Research Institute
FAD	Food Availability Decline
FAO	Food and Agricultural Organization
FED	Food Entitlement Decline
FFW	Food For Work
FID	Food Intervention Decline
FDRE	Federal Democratic Republic of Ethiopia
FGT	Foster, Greer and Thorbeck
FNS	Food and Nutritional Security
FEWS	Famine Early Warning System
FSS	Food Security Strategy
GDP	Gross Domestic Product
GFP	Global Food Policy
GIEWS	Global Information Early Warning System

GHI	Global Hunger Index
GTP I and II	Growth and Transformation Plan I and II
HRD	Humanitarian Requirement Document
HU	Haramaya University
IDPs	Internally Displaced Peoples
IFAD	International Fund for Agricultural Development
IFPRI	International food Research Policy Institute
IPCC	International Panel on of Climate Change
JZOA	Jarar Zone Office of Administration
LZs	Livelihood Zones
MDGs	Millennium Development Goals
MoFED	Ministry of Finance and Economic Development
MoARD	Ministry of Agriculture and Rural Development
MoWR	Ministry of Water Resources
NAPA	National Adaptation Paper of Action
NDRMCC	National Disaster Risk Management Coordination Commission
NMA	National Meteorology Agency
NRC	National Research council
PASDEP	Plan for Accelerated and Sustained Development to End Poverty
PFE	Pastoralist Forum of Ethiopia
PPS	Probability Proportional to Size
PSNP	Productive Safety Net Program
SBOFED	Somali Bureau of Finance and Economic Development
SC-UK	Save the Children United Kingdom
SDPPB	Somali Disaster Prevention and Preparedness Bureau
SLCRDP	Somali Livestock Crop and Rural Development Bureau
SNNPR	Southern Nations, Nationalities and Peoples Regional State
TLU	Tropical Livestock Unit
UNDP	United Nations Development Program
USAID	United States Agency for International Development
VAM	Vulnerability analysis and mapping
WFP	World Food Programme
WFS	World Food Summit
WISP	World Initiative for Sustainable Pastoralism

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MAGNITUDE AND DETERMINANTS OF PASTORAL HOUSEHOLD FOOD INSECURITY: THE CASE OF DEGAHBOUR DISTRICT OF SOMALI REGIONAL STATE, ETHIOPIA

ABSTRACT

The design and implementation of effective measures to reduce pastoral household food insecurity in the study area depends on an in-depth understanding of the dimensions, covariates and magnitude of food insecurity. Therefore, this study was carried out with the objectives of measuring the magnitude and determinants of pastoral households' food insecurity in Degahbour district of Somali Regional State. To achieve these objectives, cross-sectional data on demographic, socio-economic and institutional characteristics were collected from 123 households drawn randomly from four kebeles. Quantitative data was collected through structured interview schedule and qualitative data was collected through focus group discussions were used to generate data. The main tools of data analysis for this study include Foster-Greener-Thorbek, descriptive statistics, and binary logit regression model. The head count ratio computed by Foster-Greener-Thorbek model revealed that 66.67% of sample households were food insecure while the food insecurity gap and severity were 21% and 10%, respectively. Logit model results showed that livestock holding, income from livestock sources, non-livestock income and social support significantly and negatively affected food insecurity while family size, dependency ratio, age, sex and livestock diseases incidence had a positive and significant effect on food insecurity. Finally, based on the findings of the study, some of the key recommendations to tackle pastoral households' food insecurity in the study area include, family planning, effective targeting of households with older and female heads improving the production and productivity and marketing conditions of livestock, provision of veterinary services to prevent the livestock diseases, improved utilization of resources and promoting traditional social networks for sharing resources.

Keywords: Degahbour, Food FGT, Food Insecurity, Logit, Pastoral Households.

1. INTRODUCTION

1.1. Background of the Study

Ethiopia is experiencing one of the most severe droughts in more than half a century due to the effects of El Niño. Significant rainfall deficits of up to 50 percent below average that have severely impacted the lives and livelihoods of farmers and herders throughout the country. Crop harvests were well below average, with some regions experiencing between 50 and 90 percent crop loss. The livestock sector has seen high mortality and morbidity rates and abnormal migration in search of pasture and water; with insufficient access to feed and water sources, livestock will become increasingly weak unless normal rains resume. Many families dependent on agriculture have become indebted and dependent on external assistance. The agriculture sector in Ethiopia typically supplies up to 85 percent of the country's food supplies and employs more than 80 percent of the labor force. With insecure sources of food and income as a result of the drought, vulnerable rural households face widespread hunger and malnutrition, huge economic losses and long-term environmental damage. According to Humanitarian requirements document (HRD) around 10.2 million people food insecure, more than 1.7 million households need emergency seed support and 654,000 households require livestock feed assistance in Ethiopia. These figures are increasing as the effects of drought continue to grip the country (FAO, 2016).

The Somali region of Ethiopia is one of the regions of the country most affected by recurrent drought and food security problems (DPPB, 2015). The frequency of drought and the emergencies they trigger dramatically picked up on in the pastoral areas of the Somali region during the last 16 years. The years that were recorded as drought years included: 1999, 2000, 2003, 2004, 2007, 2008 and 2015. The number of food insecure people in the region ranges from 1.2 to 1.7 million (DPPB, 2016).

The economic and social impacts of these calamities is very monumental as reflected by the recent experience in the region with political consequences and development policy implications as these climate related shocks erode the livelihood base of around 200,000-300,000 pastoralists in each and every drought year and drive them into internally displacement that faces both transitory and acute food shortages. Historically, Jarar zone is

one of the most frequently drought stricken zones in the Somali region. For instance, in the last 16 years alone (1999-2016) there were 9 major drought incidences with minor ones hitting localized areas of the zone based on the record of the early warning institutions (DPPB, 2015).

Degahbour district is one of the districts worst hit by droughts. The occurrence of droughts with an increased trend both in frequency and magnitude in the district totally or partially gave rise to the decline of the livelihood base of thousands of pastoralists through loss of their livestock assets and exposed their families into the risk of food insecurity which led to the emergence of large number of IDPs in the district (DPPB, 2016). Therefore, better understanding of the root cause and contributing factors of pastoral households' food insecurity in Degahbour district become an interesting issue and a researchable gap, attracting my attention and interest to study and investigate.

1.2. Statement of the Problem

In recent drought years, food security situation in the region was often challenged by long dry spells, occasional gaps or delays of food aid delivery and distribution (due to gaps in Donor funding and logistical hurdles), high prices of cereals and declining pasture and water availability, particularly in areas that received below normal rains. Through the deterioration of livestock body condition, decreased milk yield and plummeting livestock prices, droughts reduced access to food at household level and hence increased malnutrition rates (children from poor households) and disease outbreaks for both human and livestock. The rural livelihoods of Somali region comprise mainly pastoralism (60%) and agro-pastoralism (25%), with the remaining (15%) constituted by sedentary and riverine area farming. Agriculture particularly livestock production is the main source of livelihood for the region. Despite considerable livestock potential and the various efforts made to improve its production performance, still productivity of livestock in terms of milk and meat remained very low due to consecutive droughts occurring that have resulted in heavy livestock losses and depletion of the wealth basis of local communities (DPPB, 2015).

These droughts have come in quick succession, leaving no time for herds to reconstitute and pasture to regenerate that led to low production and productivity of livestock which caused food insecurity at household level. Households with insufficient access to food often face

other challenges related to food insecurity including poor health and a decline in productivity. These challenges can often create a vicious circle where households are unable to produce enough food, even in good years, because they are battling chronic health issues and are unable to work to their full potential. The gravity of food insecurity, and its many rippling effects, has led much of the development agenda to search for specific areas for intervention given limited resources and growing populations in pastoralists' areas (DPPB, 2016).

The pastoralist livelihood system in the region is under serious threats due to these consecutive hazards and other internal and external factors. These factors have severely undermined the pastoral system, their livelihood, market and economic system and in general food security cycles because the pastoralist livelihood system is one of the heavily affected and climate-sensitive sectors (SC-UK and DPPA, 2014).

Decades of growing livelihood challenges taking their toll in the pastoral areas of Jarar zone in the Somali Regional State of Ethiopia have left many pastoral communities struggling to make ends meet economically. Degahbour district which is under Jarar administrative zone has experienced the worst droughts in the history of the district. The increasing frequency and severity of droughts is mainly due to climate change, environmental degradation, shrinking resource base, population growth and conflicts over the scarce resource (DPPB, 2012). This has led to death of substantial number of livestock and reduced livestock production and productivity resulting in increased food insecurity in the study area. Moreover, many studies identified socio-economic, demographic and institutional factors affecting food insecurity of the pastoralists which vary spatially and temporally. There are scanty empirical researches conducted in the region so far like Hilina (2005) on poverty and Guled (2006) on agro-pastoral food insecurity which was carried out with different livelihood context of the study area and a long time has been elapsed, while the food insecurity is dynamic and temporal in nature. However, there are few assessments such as DPPB (2016), SC-UK and DPPA (2014), which are qualitative in nature conducted on pastoral food insecurity of the study area.

Therefore, this study tries to fill this research gap and aims to build a detailed understanding of pastoral food insecurity in the study area and narrows the existing information gap on food insecurity.

1.3. Objectives of the Study

The general objective of the study was to assess the magnitude and determinants of pastoral households' food insecurity status in Degahbour district of Somali Regional State of Ethiopia.

The specific objectives of the study are:

1. To estimate the magnitude of pastoral households' food insecurity in the study area; and
2. To identify the determinants of pastoral households' food insecurity status in the study area.

1.4. Scope and Limitations of the Study

The study was conducted in Degahbour district of Ethiopian Somali regional state. It covered only four of the 11 pastoral *kebeles* of the district from which a total of 123 sample households were selected. There are a number of limitations that the study has. First, it uses cross-sectional survey data that does not capture inter-temporal variation or the dynamic nature of food insecurity. Household was the unit of analysis in this study. Secondly, it is limited to capturing the magnitude and determinants of pastoral households only. Finally, the data was collected during a dry season which can contribute to the prevalence of food insecurity to be little bit higher than normal time.

1.5. Significance of the Study

The main reason for focusing on rural pastoral households' food insecurity is that the vast majority of the poor reside in rural pastoral areas, where the incidence and magnitude of food insecurity is usually higher than in the urban areas due to low physical assets available in rural pastoral areas. Furthermore, deficiency in infrastructural facilities in the form of low education and functional skills, coupled with poor health care, serve as barriers to escaping food insecurity.

All these facts do underscore the significance and urgency for the pastoral and rural household food insecurity research theme. Therefore, proper understanding of these characteristics of food insecurity and underlying conditions constitutes an essential starting point and is a key to the formulation of food security policies, designing appropriate strategies and practical steps the government and other stakeholders can take in order to reduce food insecurity and promote sustainable growth at all levels. As a result, it is expected that an understanding of the patterns of food insecurity and the relationship between food insecurity and socio-economic factors can provide the necessary basis to formulate appropriate measures and intervention strategies. This would also contribute to expanding the knowledge of food insecurity status of pastoral food insecurity affecting rural households at local level. Therefore, the outcome of this study would contribute towards scrutinizing of the extent of food insecurity problems in the society, its distribution and underlying features. This will be used as base information that further serves as a starting point and the first step towards building workable strategies and designing better-informed interventions to reduce food insecurity in the study area as well as areas with similar characteristics. Consequently, researchers, local government, non-government organizations and relevant stakeholders may benefit from the result of the study to direct their efforts of reducing food insecurity.

The study focuses on magnitude and determinants of pastoral households' food insecurity in Degahbour district of SRS Ethiopia. The study aims to enlighten the concerned institutions like NGOs and GOs as well as policy makers for a better and thoughtful decision for improving the pastoral food insecurity situation in the study area

1.6. Organization of the Thesis

This thesis is organized into five chapters. Chapter one covers the introduction and is subdivided into background information on the context of the research, the research problem, scope, limitations and significance of the study, objectives, and organization of the research thesis. The second chapter deals with literature review that includes theoretical approaches to food insecurity and empirical studies made in the country and elsewhere in the world. The third chapter presents a brief description of the study area and the methodology employed in the study.. Chapter four goes on dealing with the results and discussion of the research outcomes and finally chapter five covers the summary and recommendation of the study.

2. LITERATURE REVIEW

In this chapter, definitions of the basic terms and concepts, theoretical approaches, measurement and indicators of food insecurity, national food security policies and strategies, causes and types of food insecurity, current food insecurity situation in Ethiopia, food , food insecurity of Ethiopian Somali Regional state, conceptual frameworks, empirical and related literature review are presented.

2.1. Basic Concepts and Definitions of Food Insecurity

The most commonly accepted definition of Food security is “access by all people at all times to enough food for an active and healthy life” (FAO, 1996). Food insecurity is a situation in which individuals have neither physical nor economical access to the nourishment they need. A household is said to be food insecure when its consumption falls to less than 80% of the daily minimum recommended allowance of caloric intake for an individual to be active and healthy. In particular, food insecurity includes low food intake, variable access to food, and vulnerability- a livelihood strategy that generates adequate food in good times but is not resilient against shocks. These outcomes correspond broadly to chronic, cyclical, and transitory food insecurity, and all are endemic in Ethiopia (Devereux, 2000).

During the debates that preceded the World Food Summit (WFS) held in Rome in 1996, it was established that "There is food security when all people at all times have sufficient physical and economic access to safe and nutritious food to meet their dietary needs including food preferences, in order to live a healthy and active life". When an individual or population lacks, or is potentially vulnerable due to the absence of, one or more factors outlined above, then it suffers from, or is at risk of, food insecurity. Based on the WFS (1996), the definition focuses on four distinct but interrelated elements, all four of which are essential to achieving food security:

Food availability: The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid).

Food access: Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).

Utilization: Proper biological use of food, requiring a diet with sufficient energy and essential nutrients, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.

Stability: To be food secure, a population, household or individual must have access to adequate food at all times. They should not risk losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity). The concept of stability can therefore refer to both the availability and access dimensions of food security.

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

On other hand, food insecurity is defined as a situation that exists when people lack secure access to sufficient amount of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity, poor conditions of health and sanitation, and inappropriate care and feeding practices are the major causes of poor nutritional status. Food insecurity may be chronic, seasonal or transitory (FAO, 2012).

Therefore, for the purpose of this study, the definition put forwarded by Word Food Summit (1996) food insecurity or security as a working definition to assess the situation in the study area by paying attention to how the specified emerging threats are serving to constrain and construct food insecurity (affordability, availability, utilization and stability) of pastoral

households level as the key unit of food insecurity analysis through collected cross sectional household data in the study area. Based on this, terms such as availability/sufficiency, access, sustainability/vulnerability, and time dimension of food security are used in this study to investigate the food insecurity status of Degahbour district pastoral households in Jarar zone of Somali Regional state of Ethiopia.

2.2. The Concept of Pastoralism

Pastoralism is a way of life, which is well suited to the arid and semi-arid parts of Africa (Fassil, 2001). In sub Saharan Africa, Sudan and Somalia have the largest pastoral/agro-pastoral population followed by Ethiopia (Abiyot 2008).

Pastoralists are those who primarily drive their living from the management of livestock (sheep, goat, cattle and camel) on rangelands. Traditional pastoral systems are of three types (Ellis, 2000).

- i. Sedentary:** are more or less permanently settled with their animals within a defined area.
- ii. Semi-nomadic/transhumant:** move with their animals over more or less regular routes, settling for part of the year in permanent home area.
- iii. Nomadic:** move with their animals and transportable homes over irregular routes, seeking pasture and water for their animals almost continuously.

Pastoralists derive 50 percent or more of household gross revenue from livestock or livestock related activities. Agro-pastoralists are people engaged in both pastoralism and agriculture and derive more than 50 percent of households' gross revenue from farming and 10-50 percent from livestock.

2.3. Theoretical Approaches to Food Security

It has been emphasized that the concept of food insecurity appears too complicated and complex to be meaningfully and effectively explained by a single factor or a single academic

discipline (Sarracino, 2010). As a result, broad and various theoretical perspectives have been propounded and refined overtime in the attempt to bring us closer to understand the rudiments and direction of food insecurity. Thus it is worthy of note that theorizing and conceptualizing food security have evolved and proceeded along a historical linear trajectory-reflecting major time epochs and socio-economic conditions.

The general approach has pointed out a number of environmental and socio-economic attributes assumed to explain food security. The principal ones include: rapid population growth, war and civil strife, drought, ecological degradation, government mismanagement, unequal access to resources and unequal exchange, socio-economic and political dislocation (Getachew, 1995).

2.3.1. Demographic Theories (Malthusian and Neo-Malthusians)

This approach has its roots in the postulations of Reverend Thomas Malthus (1766-1834). The main thrust of the theory is to establish a relationship between population growth and life-sustaining resources. The main assumptions of this approach are essentially that: while human population grows at geometric rate, land and food supplies increase at arithmetic rate. Consequently, because food cannot match population expansion food insecurity conditions (famine) sets in. It is further assumed that the increase demand for food as a result of the population increase can be addressed in two main ways: 1) more lands to be put under cultivation, however new lands have lower marginal productivity. 2) The exploitative intensity of cultivated lands to be increased, which results in a marginal and average productivity decline. Given this, the average productivity of work would fall below the subsistence wage-the wage which guarantees a household survival (Todaro and Smith, 2012).

In any case, this approach still holds some relevance in contemporary times and to this study as it offers the basis that brings us to understand and better appreciate not only the growth but also other evolving socio-demographic dynamics such as the age, sex, household size and education, and their relationship with the phenomenon of food insecurity. In fact, some of its assumptions and even limitations would contribute towards a thorough analysis and discussion of the issues under consideration.

2.3.2. Climatic Theories (Food Availability Decline—FAD) Approach

The Food Availability Decline Approach had been a dominant theoretical explanatory framework for food crises since the eighteenth century until the year 1980. As quoted in Getachew (1995), Sen (1981) defined FAD as “The availability decline per capita of food for consuming unit”. This approach conceived famine as shortages of food supplies per capita, motivated by natural factors; like drought, floods and other calamities that undermine crops; or demographic factors, i.e., vegetative growth that goes beyond supply (Diana, 2007).

The Food Availability Decline (FAD) view assumes that food insecurity is caused by a sudden reduction of food supply. The major drivers being especially natural disasters and such other factors that have the capacity to constrict food supply. In the event of this, the prices of food increase thereby straining the capacity of people especially the vulnerable to meet their food needs. *“The FAD approach claims that whatever has caused an acute decline in the supply of food is a necessary condition for famine to emerge”* (Yaro, 2004).

The central argument of this model is that “anything which disrupts food production such as drought, flood or war can cause famine, the logic being that a drought, flood or war causes crop failure and cattle death, reducing the availability of food in the affected region, and that such a food availability decline for an extended period by definition constitutes of famine” (Markos, 1997; Devereux, 2006; Degefa, 2002). Hence, this argument claimed that hunger and famine do not necessarily evolve from lack of food supplies in the market, but lack of resources in sectors to produce or purchase them.

According to the FAD approach, all that is needed to avert food security crises is the increasing supply of food relative to population growth. In other words, the approach equates adequate food supply with adequate food security and nutrition for all (Sarracino, 2010). This thinking led to the development of green revolution technologies especially in Asia and Latin America, with international actions and calls for national self sufficiency in agricultural productivity (Yaro, 2004).

Incontrovertibly, food insecurity can arise as a result of food availability decline. However, this approach is still not without major limitations. Thus, the main inherent limitation is that it fails to recognize the important fact that food insecurity causes may be many and varied. For

instance, equally important determinants are income inequalities and distributional constraints (Sen, 1981; Devereux and Maxwell, 2003).

The review of this theory highlights the dramatic factors such as natural (climate) disasters that could cause sudden and marked decline in the availability of food aside population growth which represents a relatively subtle driver of food insecurity. This would allow for a more comprehensive understanding of how the climate situation affects food security in the study area.

2.3.3. Food Policy Failures (Food Intervention Decline—FID) Approach

The Food Policy Failures (Food Intervention Decline- FID) emerged apparently as a result of deficiencies associated with earlier approaches especially the FAD. The FID approach contends basically that food insecurity is as a result of misguided and poor policies and services. Hence, all actors charged with policy formulation, research, monitoring and evaluation must live up to their responsibilities to effectively deal with the food insecurity situation at specified levels. One other explicit assumption of this approach is lacking faith in market forces as being able to play out to and resolve the issues surrounding food insecurity.

Essentially, thus the approach recognizes the crucial needs for the adoption of a well-coordinated and focuses interventional posture to dealing effectively with the global food security situation. Consequently, food security issues and policies have become a central plank of political institutions and a top issue on the agenda of non-governmental organizations and global institutions. This approach can really be found to be behind the shift in focus and heightening interest in food policies at the turn of the century. Apt and useful example was the institution of the MDGs (capturing broad issues of food security concerns) which has served as a guiding post towards the formulation of regional and national food security policies (Sarracino, 2010).

The FID approach has also been debated and criticized on several fronts. One major limitation is that, governments especially in developing countries are less accountable due to weak institutions to formulate and effectively deliver on policy. Besides, interventions by foreign institutions and associations have always been found not to effectively deal with local

needs due to poor assessment, insufficient consultation and inactive local participation (Sarracino, 2010).

Summing up, the review of this approach allows for a close assessment of the effectiveness of food security policy interventions in our development efforts, especially in respect of the emerging threats that have been identified and discussed. This is important as the principle of direct and effective intervention in the food sector is critical in addressing the issues of food insecurity.

2.3.4. Food Entitlement Decline (FED) Approach

Amartya Sen's influential book 'poverty and Famine' (1981) decisively shifted the focus of famine analysis from supply side to the demand side. The entitlement approach emphasizes access to food, or people's relationship to the food, rather than the availability of food (Devereux and Maxwell, 2003). The main argument of this model is the mere presence of food in the economy or in the market does not entitle a person to consume it and thus starvation can set in without any obvious aggregate available fall (Getachew, 1995).

This view was born out of the fact that although aggregate food supplies may have been increasing, as shifts in statistics may suggest, available evidence equally indicate that millions of people are food insecure. Thus, it became more apparent that the increase in and availability of food cannot alone in any way guarantee access to all. Equally important are factors such as the distribution and individual and groups ability to access the available food. Hence the individual and his/her entitlements matter. Sen (1984) defines entitlements as "the set of alternatives commodity bundles that a person can command in a society using the totality of the rights and opportunities that he or she faces".

This Entitlement failure view represents a multi-perspective and coherent approach to assessing and better appreciating the phenomenon of food insecurity at the micro-level (individual and households) in different contexts. However, it did not represent the magic wand as food security issues are still glaringly pronounced. Thus, upon scholarly scrutiny several inherent limitations have been advanced. Even, Sen himself identifies four limitations to his approach. Thus, possible ambiguity of the specifications of entitlements, characteristic problems and violations dogging the concept of rightful transfers (such as looting and

brigandage), choosing to starve and to starve others (partly explained by inter-household power relations, ignorance, fixed food habits, or apathy) and “finally the approach focusing of starvation, which has to be distinguished from farm mortality, since many of the famine deaths—in some cases most of them—are caused by epidemics” (Devereux, 2001; Sarracino, 2010).

Further, Devereux (2001) sees Sen’s approach “as a descriptive rather than a normative concept; entitlements derive from legal right rather than morality or human rights”. It is also noted that Sen’s approach did not excel at taking into account aggregate food supply but focuses exclusively on distribution thereby ignoring aggregate shortage. Further, it is argued that Sen readily embraces the traditional definition of famines as characterized by widespread starvation and high mortality. By this contention, Sen only pays attention to the very end of such a process completely ignoring the entire process leading to this end (Sarracino, 2010).

Some of the catastrophic famines have occurred without FAD. For example, the Bengal famine of 1943, the Ethiopian famine of 1973 and 1984, and the Bangladesh famine of 1974 occurred due to lack of entitlement rather than due to lack of availability short fall (Fasil, 2005).

Among many positive features of the FED approach over FAD, the following are very important: First it has emphasized upon demand rather than supply. Second, it allows vulnerable groups to be identified. Finally, it suggests more appropriate policy intervention (Devereux and Maxwell, 2003).

Although this approach has the above mentioned strength upon FAD, it has also its own limitations. Generally, food security signifies the combination of the above two approaches and food utilization because enough food must be available, and households must have the capabilities to acquire it (Degafa, 2002).

From the foregoing, the critical review of the various major theoretical approaches and alternative explanations to food insecurity (famine)-Malthusian and neo-malthusian, Food Availability Decline (FAD), Food Intervention Decline (FID) and the Entitlement Failure Approach (EFA)-describing their foundations and evolutions, basic assumptions, applications, implications and limitations is important as it gives a broader and balanced

theoretical perspective as it teases out the core guiding principles and variables of concern (demographic dynamics, climate extremes, price volatility, and land accessibility) that provide the basis for proper conceptual and empirical assessment, as well as a rigorous analysis and discussions of results of the this research study.

2.4. Measurement and Indicators of Food Insecurity

In the food security literature, there are a number of measurements and indicators of the concept of food insecurity. The notion of food insecurity here refers to the main four dimensions of food security that are availability, accessibility, utilization and stability. However, the use of these measures and indicators are not thoroughly same, largely due to process, characteristics, composition or situation. In 2002, FAO organized a Scientific Symposium on measurement and assessment of food deprivation and under nutrition. The symposium proposed five methods for food security and hunger, namely undernourishment measured which is a combination of data from food balance sheets and surveys of household income and expenditure; food insecurity measurement using data from surveys of household income and expenditure; dietary intake measurement using individual intake surveys; child nutritional status measured using anthropometric surveys and people's perception of food insecurity and hunger measured using qualitative methods (Napoli, 2011).

In common there are five methods used to measure or assess determinants of food security and food insecurity, including estimating calories available *per capita* at national level, the second method, household income and expenditure surveys, third method, individual's dietary intake, fourth method, anthropometry and fifth method, experience-based food insecurity measurement scales (Perez-Escemilla and Segall-Correa, 2008). However, all these methods have their own strengths and shortcomings based on application, but overall they complement each other. The experience-based food insecurity measurement scales method is the only method that to use measures of food insecurity at national, household and individual levels (Perez-Escemilla and Segall-Correa, 2008).

Primarily, there are two common methods that are widely used as a measure of food insecurity. The first is to estimate the gross level of the household in terms of production (availability) and purchases (accessibility) over a period of time, and at the same time to

estimate the growth and depletion of food stocks in terms of possession and consumption (utilization). The second method is to undertake a 24 - hour recalls of food consumption for a household member, and then analyze composition of food both caloric and nutrient content (Maxwell, 1996). These two methods have been criticized and faced challenges. As Maxwell (1995) said both of them are not accepted as a gold standard, for analysis of household food security and insecurity.

Food security and insecurity has tens of different indicators, which is difficult to provide defining features, because of complexity, involve factors and consequences. However, to develop an effective tool for intervention in order to address existing food insecurity problems, a better understanding of indicators is significantly vital. Food insecurity indicators can be categorized into two main levels, namely the macro or national level, included food supply, access and utilization indicators, to assess food availability against daily energy requirements, and micro level, included nutritional status marker such as wasting and stunting indicators that are the most frequent indicators (Ghattas, 2014).

According to Gross *et al.* (2000) the most common food and nutrition security indicators at different levels can be classified into three categories, namely supply and demand indicators, which is defining food availability, the second, price and consumption indicators, which is describing food accessibility and the third one, the outcome indicators which is relating adequately utilizing food and convert into satisfactory nutrition situation.

Table 1: The most common food security indicators at different levels

Social level	Availability	Accessibility	Utilization	Stability
Macro (world, national, region)	Fertility rate Food production Population flows	Food price Wages Per capita food Consumption	Stunting rate Wasting rate	Food fluctuation Regional food gaps
Meso (community, zone, town, district or kebele)	Harvesting time Staple food production	Market Retail food price	Latrine coverage DD rate	Pre/post-harvest food
Micro (HH, family or individual)	Food storage Consumption of wild foods	Meal frequency Food frequency Employment	Weight-for-age Goiter Anemia	Pre-harvest Practices Migration

Source: Gross *et al.* (2000)

Despite these differences, between all measurements and indicators, all elements are correlated vertically and horizontally by nature, in terms of causes and effects.

2.5. National Food Security Policies and Strategies of Ethiopia

Ethiopia has designed and implementing several strategies and policies to guide and manage its development goals to fight hunger and eradicate the prolonged poverty and to achieve as well international targets in the fight against hunger. These strategies and policies include the Food Security Strategy (2002), the National Nutrition Strategy and the National Nutrition Program (2008), Development and poverty Reduction Program (2002/03-2004/05), the Plan for Accelerated and Sustained Development to End Poverty (PASDEP), which ran between 2005/06-2009/10, National Adaptation Programme of action (2007), the Growth and Transformation, Plan (GTP I) covering the years 2011-15, and the National School Health and Nutrition Strategy (2012), the Agriculture Sector Policy and Investment Framework

(PIF) 2010-2020, aligned to the CAADP, Growth and Transformation Plan (GTP II) covering the years 2015-2020 (MoFED, 2015 and ATA, 2012).

All these strategies and policies are intended in support of growth and poverty reduction at the national level. Still, several of these strategies are continuing and expected to change the country's milestone of development agendas.

Furthermore, there are a range of policies and programs that have been designed to implement within the strategic frameworks of the agricultural transformation system, to boost agricultural production and productivity and ensure food security and nutrition at national level. Notably, they are improving access to agricultural inputs, increasing tenure security for small and large-scale rural investment to encourage public-private partnership investing in large-scale commercial farms, and also building resilience to promote graduation from safety net programmes and likewise the Emergency Food Security Reserve Administration (EFSRA), similar general investment benefits and incentives, for promoting of exemption from import customs duty and other taxes investors engaged those investing agriculture and agro-industry areas (MoFED, 2015).

To address the distressing situation of food insecurity, the Ethiopian Government, in addition to the ongoing macroeconomic policies that are targeted to re-orient the economy toward a free market system, has endorsed a number of other policies. Among these are the draft Food Security Strategy, the National Policy of Disaster Prevention and Management, the Population Policy and Environmental Policy (MoFED, 2014).

In 1996, the Ethiopian government developed a draft Food Security Strategy and in 1998, a Regional Food Security Program, which was targeted to tackle the problem of food insecurity in the four major regions namely, Tigray, Amhara, Oromiya and SNNPR was developed. The first version of the food security strategy was prepared in 1996 and was revised through intensive dialogue and broad participation of the federal, regional and donor community (FSS, 2002).

The revised strategy targeted mainly at the chronically food insecure, moisture deficit and pastoral areas. It is characterized by a clear focus on environmental rehabilitation as a measure to reverse the current land degradation. At the same time the focus on biological

measures as a source of income generation for food insecure households differentiates it from the 1996 strategy. Water harvesting and introduction of high value crops, livestock and agro-forestry development have been new elements in the revised strategy. In recognition that the pursuit of food security is a long term and multi-sector challenge, institutional strengthening and capacity building is included as sectoral element of the strategy (FSS, 2002).

The strategy is intended to address both supply and demand sides of the food equation: availability and entitlement, respectively within the framework of National Agricultural and Rural Development Strategies. This could be affected from the perspective of ensuring both food securities at national and household levels taking into consideration the diverse nature of the country's economy. The strategy adopted rests on three pillars. Increasing the availability of food through domestic (own) production; ensuring access to food for food deficit households; and strengthening emergency response capabilities (MoFED, 2014).

1. Increasing domestic production: According to the strategy, availability of food is going to be increased by farming intensification and opening up new lands for cultivation, as well as diffusion of simple technology packages to small land holder farmers in areas where there is reliable rainfall. These include introduction of irrigation in areas with less reliable rainfall; and enhancement of livestock products through improved livestock breeds, better nutritious animal feeds and better animal services as the main ingredients to stimulate increase in food production. In addition, to promote food production, the strategy anticipates, to create a stable macroeconomic environment, encourage the private sector to invest in agricultural production, processing and marketing, intensify agricultural research and training programs, strengthen security of access to land and improve small farmers' access to better rural roads to promote the expansion of rural enterprises that generate non-farm incomes. In addition, the strategy incorporates the need to create employment, increase and diversify agricultural exports and address the specific problems of pastoral areas (MoFED, 2014).

2. Ensuring access to food (demand side): Food insecure farming households as well as the non-farming community get some and/all of their food from the market. Farmers need market to supplement their own production while the later use it as the only source. To purchase food from the market, households need sufficient income that can cover at least their minimum food and nonfood requirements. However, many households in the drought prone and moisture deficit as well as urban areas lack sufficient income to meet their basic needs

(FDRE, 2002). With respect to the above perspective, the revised strategy has indicated food security measures aimed at addressing demand side problems within the framework of the Rural Development Policies and Strategies. These include:

a. Micro and small-scale enterprises: the envisaged market led agricultural development is expected to lead to large-scale direct and indirect growth in non-farm incomes and employment. To this effect, the strategy points out promoting and strengthening micro and small scale enterprise development through industrial extension services. These developments are believed to create additional employment opportunities in the private sector (FDRE, 2014).

b. Improving the food marketing system: the policy of the government regarding agricultural marketing and distribution is to encourage the participation of the private sector and cooperatives to improve the efficiency of the system. On the marketing front, parastatal business enterprises are expected to play significant roles in stabilizing prices as well as reaching farmers who are far from agricultural input market. To benefit from all these policy measures, the food security strategy emphasizes on measures related to establishment of market stabilization schemes (for prices of strategic food crops) along with agricultural price and market information system (FDRE, 2014).

c. Supplementing employment and income-generating schemes: the strategy points out off-farm income generating activities would help supplement own production for a considerable number of farmers as coping mechanisms during periods of food shortages. To this effect public employment generation schemes (EGS and FFW) are proposed. This would intern help contribute to soil conservation, the construction of roads, small-scale irrigation, water supply and sanitation. This again leads to food production increase, reduce real rural food prices and improved health conditions. It would also help improve environmental protection and natural resource conservation.

d. Targeted program: these programs are primarily designed to transfer resources aimed at both developing capacity for self provisioning and support vulnerable groups, who would not be capable of self-provisioning during short and medium term. The former scheme is aimed at provision of inputs (seed and fertilizer), small agricultural tools and implements to resource poor farmers (food insecure) extending small loans to destitute women to help them develop sustainable livelihood. The latter scheme involves cash transfers to orphans, the aged and handicapped or self targeting food subsidies for particular vulnerable groups (FDRE, 2014).

3. Emergency capabilities: In addressing the risks of household food security, the strategy focuses on strengthening emergency capabilities such as the monitoring surveillance and early warning arrangements, the capacity for food and relief distribution, strategic reserves of food grains, and its analysis of the international food trade and aid situation. Strengthening such capabilities is noted to be based on the successful experiences and a focus on developing decentralized distributive arrangements (MoFED, 2014).

Generally, the Government of Ethiopia has designed a strategy to improve food security in the country by addressing both the supply/availability and the demand/entitlement sides of the food equation in three components. The first component, economic growth and employment, consists of maintaining sound macro-economic and population policies; giving priority to rural development focusing on agriculture; holding or lowering real consumer food prices through increased food production and lower-cost marketing; encouraging rapid growth of small business enterprises that create jobs; diversifying agriculture and promoting exports in support of food trade; and developing measures for regions with less reliable rainfall and pastoral areas. The second component is establishing additional entitlement/access and target programs including supplementary employment/income schemes, targeted programs like safety net program for very poor and vulnerable groups, and nutrition and health interventions addressing those at the highest risk. The final component is strengthening emergency capabilities for monitoring, surveillance, early warning, and food and relief distribution in kind and cash (FDRE, 2015).

2.6. Causes and Types of Food Insecurity

Food insecurity exists when there is unavailability of safe food, insufficient production and purchasing power or lack of food utilization at the household level or community level. However, there is primarily diversity of factors responsible for food insecurity and attributed reasons and causes of food insecurity. Nevertheless, in general the factors that cause food insecurity are wide and differ from country to country. Unarguably, all these factors affect the four elements of food security, namely, availability, stability, access and utilization of food, not only food and agricultural sector but several sectors can be affected.

Drought is ranked as the most common cause of severe food insecurity and famine, and represents a constant threat to the food security, particularly in developing countries (FAO, 2011). Therefore, drought has tremendous impacts on agriculture like crop losses, livestock production losses, natural habitat and resources depletion, land degradation, plant and animal diseases incidences, also on human health include risk of malnutrition and food-borne diseases and water shortage (FAO, 2015).

The rapid population growth and demographic both are factors cause of food insecurity, also natural disaster, include drought, floods and climate change. These factors reduce food production and productivity and livestock production. The economic factor is also a contributor to food insecurity and affecting food security status, such as credit, livestock holding, and productive assets and others (Yenesew, 2015).

Several studies conducted to identify different factors that cause food insecurity. Notably, these are deterioration of food production due to varied reasons, instability and armed conflict, low livestock price, frost, pest and plant diseases, soil erosion and poor fertility, lack of good governance, political instability and violence, social upheaval, inequitably distribution of resources or basic services, competition over scarce resources, marginalized of specific segment, poor social service and infrastructural condition are triggered or deepen factors of food security (Berhanu, 2001; Tilaye, 2004; Hussein, 2006, as cited in Birara *et al*, 2015). The consequence of these factors is either food injection to the national food stock and hubs, due to food unavailability or food relief distribution to the needy people due to food insufficiency at household level or individually (Ilaboya *et al.*, 2012).

Nonetheless, all these combination of factors and others have resulted in serious problems of food security status in Ethiopia, which makes the country one of the most food insecure and most dependent on food aid in the developing countries. Agriculture accounts for nearly half of Ethiopia GDP, and contribute 90% of the country's exports (Anderson *et al.*, 2015). In contrary, one of the fundamental causes of food insecurity, hunger and extreme poverty are over reliance on low productivity subsistence agriculture, which is vulnerable to climate variability. As a result, the country experienced a recurring number of famines, both in scope and intensity, included 1972 - 1975, 1983 - 1985, 1989 – 1990, 2002 – 2003, and 20009-2010 (Lebeda *et al.*, 2010).

FAO (2015) pointed out an important but rarely mentioned factor of food insecurity: that is globalization of free market impacts on food security of emerging economies or developing countries and the search for new sources of green energy as an alternative option of energy. To sum up, the causes and underlying factors of food insecurity are different widely from country to country and from region to region. But, the major causes include the following: protracted droughts and uncertainty and unpredictability of weather and climate, civil insecurity and local crop production short falls (ADB, 2012).

In the Somali Regional State of Ethiopia, where the dominant population is pastoralist, the major underlying factors that cause food insecure, including recurring drought, conflict over water and pasture browse, restriction of mobility, poor market and livestock demand, low livestock demand, pressure on scarce natural resources due to the high influx of animals and movement, crop failure for agro-pastoral populations and wolverine populations and floods (FEWS, 2010; FAO, 2000 and 2016; Devereux, 2006).

According to (MoARD, 2008; Devereux, 2006; Mohammed, 2004; Skinner, 2010; Yemane, 2003; ANRS, 2010; SOS Sahel Ethiopia, 2008) the major causes that exacerbate the food insecurity situation in pastoral areas of Ethiopia are rangeland degradation, drought, human and livestock diseases, climate change, lack of basic services & infrastructures and recurrent conflict that are summarized as follows:

Persistent and Prolonged Drought: drought is the most common hazard in pastoral and agro-pastoral areas of Ethiopia. Particularly, there have been notable droughts in the eastern lowlands of Ethiopia where pastoralists experienced considerable human and livestock death and disruption of livelihoods. Persistent and prolonged drought episodes as a major cause of food insecurity occur when rainfall is below expectation in any area for an extended period. The most direct impact of a shortage in rainfall on pastoralists' livelihoods is the drying up of water sources and declining forage resources for livestock. Water and forage as the most important resources for pastoralism, changes in their availability greatly influences pastoralists' livelihood and food security situation. Livestock as the most important asset and source of food for pastoralists and its productivity is directly dependent on access to forage and water resources (MoARD, 2008; ANRS, 2010).

Thus, access to forage and water resources tends to decrease during a large scale drought with the result that pastoralists lose assets. The value drops to the extent that they can no longer purchase the food they need to sustain themselves. Consequently, pastoralists lose their food entitlement and drought can turn into famine (Devereux, 2006).

In general, droughts in pastoral areas have adverse socio-economic and environmental impacts. Social impacts such as decreased water availability leading to water shortages and travel over long distances by women and children in search of water, abnormal community mobility; increased school drop-out due to community migration in search of pasture and water, increased human diseases; increased competition and conflicts over scarce resources, increased food insecurity and malnutrition mostly affecting children, pregnant women, the elderly and the disabled. Economic impacts include decreased livestock productivity in terms of milk and meat, death of livestock, decreased livestock prices and household incomes, crop failure in agro-pastoral areas. Droughts in pastoral areas have also environmental impacts such as loss of rangeland biodiversity, increased rate of overgrazing, and rangeland degradation (ANRS, 2010).

Rangeland degradation: Rangeland degradation can be understood as a significant change in plant species composition from the desirable perennial-dominated to the undesirable annual-dominated species as well as, an increase in woody plants on range previously dominated by perennial grassland. Rangeland degradation is the most serious challenge and cause of food insecurity in pastoral livelihood systems by reducing the quantity and nutritional quality of the vegetation available for livestock grazing (MoARD, 2008; Skinner, 2010).

Livestock feed scarcity: In pastoral livelihood systems, livestock play pivotal role for people's food security. Cattle, goats and camels, in particular, have great importance that goes beyond the source of food. Their value is based on the full set of services they supply (milk, meat, hides, draught power), their asset value as a form of savings, and their cultural symbolism. Natural grasslands and savannas are the major livestock feed although tree leaves and crop residues are an important supplement during the dry season in agro-pastoral areas. Pastoral livelihood systems are determined to a great extent by the seasonal variations in the quantity and quality of the natural livestock pasture. Feed scarcity is therefore a serious threat as livestock malnutrition cause mortality of weak livestock and reduced reproduction and

production rates. Thus, shortage of feed can result in reduced livestock reproductive capacity and deteriorating physical livestock condition and decreasing yields (milk, meat, lower market values) exacerbate food insecurity situation in pastoral areas (MoARD, 2008; Devereux, 2006; Mohammed 2004; Skinner, 2010).

Expansion of human and livestock diseases: Human health has always been a problem in pastoral areas having one of the highest child mortality rates in the country, inextricably linked to climate related risk, such as drought and floods related diseases like malaria, tuberculosis, and watery diarrhea. Given the inadequacy of medical facilities, and qualified and trained local personnel, ensuring pastoral food security has become challenging. In addition, the lack of nutritious pasture and the resultant under-nutrition expose pastoral livestock to various water-borne vector diseases. Thus, the prevalence of human and livestock diseases in pastoral areas exacerbate the food insecurity situation and makes them more vulnerable to other risks (Skinner, 2010; Yemane, 2003; ANRS, 2010).

Climate change: Ethiopia is vulnerable to extremes of climate change and variability. Particularly, in lowland areas characterized by harsh and unpredictable dry land environment, climate change is likely to increase the frequency and magnitude of climate related disasters events such as drought, flood and other associated livestock diseases. Climate change further complicates the problem of drought, particularly in areas where rangeland degradation is severe and increases the frequency & intensity of drought occurrence and lead to food insecurity (Skinner, 2010; Yemane, 2003; ANRS, 2010; SOS Sahel Ethiopia, 2008).

In sum, rainfall pattern is changing from time to time and temperature generally increasing, and such variability in the climate is exposing the people to the risks of several climate related disasters. Thus, in pastoral areas of Ethiopia where erratic and unreliable rainfall make people be exposed to drought, risks of flooding hazards, and conflict over increasingly scarce and fragile resources leading to recurrent food shortage.

Limited access to basic services and infrastructures: access to road and market plays a pivotal role in people's food security, particularly in mobile pastoral communities. Limited Services and infrastructures like road and communication structures, and no or poorly developed market & urban centers in pastoral areas limits people's access to food. In addition, low levels of access to education, health & other social services in pastoral areas of

Ethiopia further exacerbate the food insecurity situation (Skinner, 2010; ANRS, 2010; SOS Sahel Ethiopia, 2008).

Conflict: competition over scarce rangeland resources aggravated by land degradation, recurrent drought, and land alienation by non-pastoral communities characterizes the nature of conflict in pastoral areas. Communal Land rights & ownership in pastoralist areas, subject to constantly renegotiated user-rights, increasing tendencies of privatization of pastoral lands by individuals or corporate entities and alienation of pastoral lands for the purpose of state farms & parks also cause conflict in pastoral areas of the country. In general, conflict largely stem from resource competition where the traditional tolerance, sharing & conflict resolving mechanisms fail to mediate the competition leads to loss of life, loss of assets (livestock, access to pasture & water sources), limited mobility & resource management options, limited access to market and aggravate food insecurity situation in pastoral areas (Mohammed 2004; Skinner, 2010; Yemane, 2003; SOS Sahel Ethiopia, 2008).

Food insecurity in general can be divided into two chronic and acute or transitory. The chronic food insecurity exists or cause devastating poverty results from the loss of productive assets, while the acute food insecurity is correlated to shocks or human-induced (FDRE, 1996). The difference between two types of food insecurity is that the chronically food insecure require long term to recover from disaster, but transitory food insecure people need to get necessary support in order to cope with or adapt to hazard or shock.

According to Yenesew (2015) chronic food insecurity happens when the household is unable continually to meet the basic require food needs of household members, whereas transitory food insecurity occurs when a household faces a temporary decline to meet food needs in a short term.

2.7. Food Insecurity Situation in Ethiopia

Ethiopia is one of the poorest counties in the world and one of the most food-chronic in Sub-Saharan countries. The state of food insecurity is a critical challenge in Ethiopia development strategies and policies. Despite the government of Ethiopia has initiated and dedicated considerable efforts to address food insecurity problems and underlining causes, still food

insecurity is frightening to the population of Ethiopia. About 10% of the population of Ethiopia is classified as a chronically food insecure, and during the hazards or risks this figure rises to double than 15% (Birara *et al.*, 2015).

Nevertheless, Ethiopia is one of the world's most food insecure countries and become a symbol of hunger and starvation. The incidence of food insecurity and poverty has mostly been higher in rural/pastoralists than urban dwellers (FAO, 2015).

The Global Hunger Index last report on the 2015, the state of hunger and food security in Ethiopia is serious and scored 33.9 which is a serious category in the global hunger index evolution, however, since 2000, Angola, Ethiopia and Rwanda have significantly reduced the GHI scores down by between 25 and 28 points in each country, still the hunger, poverty and food security status in these countries are serious (Grebmer *et al.*, 2015).

Trends of Hunger Developed by Global Hunger Index of Ethiopia shows that the proportion of undernourished population, prevalence of wasting in children under five years, the prevalence of stunting in children under five years as well as under five mortality rate (%) were : 32, 8.7, 40.4 and 6.4% respectively with an average score of 33.9 (IFPRI, 2013)

According to HRD (2016) the successive failed rains has led to an acute drought aggravated by the 2015 El Niño episode and has negatively affected many parts of Ethiopia in both small scale rain-fed agriculture in the highlands and pastoralist in the lowlands. As a result, the government declared that more than 8.2 million people are in dire need for emergency food assistance.

The deteriorated situation associated with climatic shocks greatly affected the availability and accessibility of the staple food which led to severe food insecurity and high malnutrition. As HRD (2016) indicated, the poor people in the affected areas have only one time to eat to attain the minimum daily caloric required for an active and healthy household. For instance, at the onset of 2015 the identified people in need of food assistance were estimated at 2.9 million people, at the mid of the same year reached 4.5 million people, at the end of 2015 about 8.2 million people and the first part of the year of 2016 were more than 10.2 million people (FDRE, 2016; FAO, 2016).

However, the food insecurity status in Ethiopia in 2016 is an enduring. A critical challenge faces in the Federal Democratic Republic of Ethiopia to address and tackle this worsened situation which has led to sharp and severe food insecurity. Agricultural and pastoral production has dropped by 50 to 90 percent in the affected regions, particularly in eastern regions, namely Afar and Somali regions. The production completely failed, leading to critical food insecurity. As a result, malnutrition rates have increased dramatically and severe acute malnutrition admissions of children reached the highest amount and rate ever reported (FAO, 2016).

In conclusion, despite the fact that Ethiopia's immense natural and human potential resources still the country is in chronically food insecure and millions of people those basically depend on the small scale farming system and rearing pastoralists are threatened by risks and shocks.

2.8. Food Insecurity of Ethiopian Somali Regional State

The pastoral system is an old way of life based on livestock rearing such as small ruminants, cattle, and camel pastoralism as a system of livelihood and production. The pastoral livelihood system is and has been practiced in many regions of the world for centuries (WISP, 2010) and plays a significant role in conserving of natural and environmental capital (Davies *et al.*, 2014).

Pastoralism is a very complex and diverse system with high sensitivity and dynamics demanding better understanding. To evaluate the system, it needs to be seen against indicators of sustainability including ecological soundness, economic viability and social acceptability. Hence a system with diversity of livestock, mobility with territorial fluidity and reciprocity, customary institutions with deep-rooted resource management, conflicts resolutions and strong social safety nets are point of departure for food security and sustainable resource management. The pastoralists are facing cruel vulnerability to food and livelihood crisis now more than any time in the past. As has been reckoned from pastoralists' responses about their reactions towards the ongoing development strategies, the bottleneck to ensuring sustainable livelihood among the pastoralists can be viewed in two broad scenarios: first, the very design of broader policy guidelines in the pastoral context and the prevailing

misfit situations; and second, the negative livelihood impacts witnessed as a result of its implementation at bottom lines (Rass, 2006).

According to FAO (2015), the worst-affected drought worsened by El Nino hit in Ethiopia has deteriorated the existing poor pastoralists and agro-pastoralist livelihood and food security in the lowland parts of the eastern regions, including Somali region. More than 1.5 million people were identified as food insecure and in dire need of food assistance as reported by National Disaster Risk Management Coordination Commission in 2015 (NDRMCC, 2016). According to Food Security outlook update produced by FEWS (2015) the affected areas were unable to purchase and have access to their minimal basic food needs, due to acute food insecurity.

Several common issues contribute to vulnerability to extreme food insecurity that affects pastoralists and agro-pastoralists livelihoods. The major underlying causes of food insecurity in the Somali region are categorized into three main types. The first part is irregular rainfall and climatic shocks related risks, such as drought and flood, the second type is a trade / market access and mobility restricted and the third factor is the high price of cereal and staple food and source of nutritious food associated with the delay or irregular humanitarian assistance (FAO, 2000; FEWS, 2010; FEWS, 2016; FAO, 2016).

Livestock rearing based livelihood is the dominant way of life of Somali Region pastoralist. The pastoralist community constitutes about 70-80% of the whole total of the region's population. Unfortunately, there is no precise census of livestock population in the region. However, pastoralists remain the majority of the region's population, herding combinations of camels, cattle, sheep and goats. Somali region has the largest area and the most population of Ethiopia's dry land pastoral area (SC-UK and DPPA, 2005). Livestock production and sales constitute up to 50% or more of all their income. The population of the region is categorized into a pastoralist which is the majority, agro-pastoralists and sedentary farmers and about 14% are urbanized (Devereux, 2006). The region has about 17 food economy zones or livelihood system. Among these eight are categorized as a pure pastoralist, whereas, six are agro-pastoralist and only three are pure agricultural (SC-UK/DPPA, 2014).

Despite, the pastoral production system and their role in the contribution of the economy weighting in their countries as stated in Rass (2006) pastoral people are one of the poorest

population in the worldwide, among those numbers African pastoral and agro-pastoralist, where the prevalence of extreme poverty and destitute is ranged from 25 to 55 percent.

Pastoralists of the Somali Regional area are located in dry land and harsh environment and are characterized by water shortage and pasture due to recurrent droughts, land degradation, other human-induced shocks. The pastoral production system in the region is becoming increasingly vulnerable to hazards and gradually losing its resilience and adaptive capacity and becoming more food insecure. According to IPCC (2007), natural-resource dependent communities in the world are highly vulnerable to climate variability and change. The most vulnerable livelihood systems to droughts and climate variability are smallholder rain-fed farmers and pastoralists in semi and semi-arid areas (FDRE, 2007). In addition, Somali Region has a diversity of livestock-based, crop based and mixed (agro-pastoral) livelihood systems (Devereux, 2006). This diversity of livelihoods has significantly contributed in increasing the production and productivity and improves the food security situation in the region. However, several studies conducted found that the pastoral production in Somali Region is among the most vulnerable livelihood and highly food insecure (Devereux, 2006; Pantuliano and Wekesa, 2008; SC-UK and DPPA, 2008; ATPS, 2013; Mulu, 2010; PFE, 2010).

The Somali region of Ethiopia has experienced multifaceted events include climate variability for the last couple decades. These shocks have adversely resulted in loss of livestock, crop production, trade and other livelihood activities that deteriorated the food security status of the region. According to Devereux (2006), combinations of threats and shocks have threatened the production of livestock-based livelihoods and crop production made pastoralist livelihoods difficult to adapt to their environment and reduced the resilience and ability to cope with calamities, due to low adaptive and high sensitivity of climate variability. According to food insecurity assessment reports carried by different bodies in Ethiopia, most vulnerable livelihood systems to droughts and climate variability are smallholder rain-fed farmers and pastoralists in semi and semi-arid areas (MoWR, 2007).

A combination of issues, including food deficit are caused by the conflicts over scarce resources, access to financial services, markets, inadequate government policies of pastoral and agro-pastoralist, and population pressures (Riche *et al.*, 2009; cited in Mulu, 2010). Due

to these factors triggered by fragile environment and unpredictable weather the pastoralist in Ethiopia are prone to drought and food insecurity (PFE *et al.*, 2010).

To track the food insecurity status in the region for the last 10 years, it was learnt that the trend of food insecurity was uneven. For instance for 2006, according to FEWS (2006) an estimation of the total 2 million people needed emergency assistance in Ethiopia and out of the total over 1.6 million were pastoralists in Somali Region, all these people were highly food insecure and unable to meet their requirement for food, both production and access. Of the 2007 about 1.1 million pastoralists were identified by the federal government as a chronically food insecure. In 2008 about 745,000 people were in food insecurity, thus, faced a survival deficit, and about 842,000 pastoralists were on verge of to sell their productive assets (DPPB, 2008). Also, in 2009 about 12.4 million people are considered food insecure by the government, out of the total of that figure, 31 percent were found in Somali Region (FEWS, 2010).

2.9. Review of Empirical Studies on Food Insecurity

The fight against food insecurity is a global challenge. Despite significant progress over the past decade, still increasingly frequent extreme climate variability and weather and natural disasters are hampering efforts to enhance food security worldwide. According to FAO (2015), the year 2015 marks the end of two momentous international targets for hunger reduction, namely the World Food Summit goal, held in Rome and the Millennium Development Goal in 2000.

The academic literature is replete with divergent, theoretical perspectives and paradigms to enlighten and explain food insecurity determinants and underlying factors of pastoral households. Hence, this study will not be exhaustive to mention literature that empirically discussed on the food insecurity, but the study attempted to summarize the main reviews logically explained on the subject.

Ahmed (2015) carried out a study on determinants of household food security and coping strategies: the case of Bule-Hora District, Borana Zone, Oromia, Ethiopia. Ordered logit regression model was used in the study and found out that Cultivate Land Size, Livestock

holding and improved seed, sex of household head, soil fertility status and non-farm income were statistically significant determinants of food security. The researcher also found that the incidence of household food security status was computed by using the FGT of 23%.

Tilaye (2004) found that a number of problems constrain agricultural production such as pests, plant diseases, shortage of farmland and pastureland, land degradation, drought, erratic rainfall, frost and weeds have been reported by farmers as agricultural yield limiting and damaging factors. Also the shortage of farmland and pasture land are also important problems that many newly established farm families are landless and others are forced to migrate to other places. Concerning the extent of food insecurity, the majority of the households in the study area faced food insecurity and not able to cover the minimum food energy required for their household. The study also observed that households which have a larger number of oxen, small ruminants holding and larger total livestock holding in tropical livestock units have higher per capita kilocalorie consumption. Similarly, farmers have also indicated the cause of food insecurity to be drought (*belg* season rain failure), erratic rainfall, shortage of farm land due to population pressure, soil erosion, lack of oxen, low price of sheep and sheep diseases, frost, water logging and problem of pests and plant diseases. The researchers also found that the incidence, the gap, and the severity of household food insecurity were computed by using the FGT as a 66%, 30% and 12%, respectively.

Indris (2012) carried out a study on assessment of food insecurity, its determinants and coping mechanism among pastoral household of Afar National Regional State the case of zone one, Chifra district. Logistic regression model was applied in the study and found out that large family size, dependency ratio, age of the household head affected food insecurity positively where as non farm income, herd diversification and access to market affected household food insecurity negatively. The FGT result of the study also found that the incidence of household food insecurity was 65.8%.

Bashir (2010) conducted a study on food security status and coping strategy in Kabri Bayah district of Jigjiga zone of Somali Regional State. Using logistic regression model he found that among explanatory variable large family size, dependency ratio, age of the household head and pastoral conflicts affected food security negatively where as non-farm income, total livestock owned and total food aid received affected household food security positively.

Sadik (2012) carried out a study on the Dimensions and Determinant of Food Insecurity among Agro-Pastoral Households in Jigjiga district, Somali Regional State, Ethiopia. Using binary logit model he found that among the explanatory variables included in the model, income from non-farm activities, number of livestock owned (TLU), size of irrigable land, credit experience of a household head and number of oxen owned influences food insecurity of the households negatively whereas family size and dependency ratio influence household food insecurity positively. The possible explanation was that a household with large family size could not be able to provide sufficient basic needs to family members because most of them are children and not economically active.

Ahmed (2012) carried out a study on the Determinants of food insecurity and coping strategies of rural households: the case of Shalla Woreda, West Arsi Zone, Oromia Region, Ethiopia. Using binary logit model he found that among the explanatory variables included in the model, family size in AE, age and dependency ratio had significant and positive Effect on food insecurity while sex, cultivated land, livestock ownership in TLU, oxen Ownership, fertilizer use and income from safety net had a significant and negative effect on food insecurity. The researchers also found that 62 percent were food insecure, the food insecurity gap and severity of the sampled households computed by using FGT indices were 8.5 and 1.4 percents respectively.

Adisie (2016) carried out a study on the household food insecurity and coping mechanisms in Menz-Gera district of Amhara Regional State, central Ethiopia. Using Tobit and probit regression models, he found that among the explanatory variables included in the Tobit model, sex, education, irrigation, non/off-farm participation, oxen, livestock holding, farm size, family size, pest and insect incidence and distance from market center were statistically significant determinants of food insecurity in terms diet quantity while he found that among the explanatory variables included in the probit model, sex, family size, education, irrigation, farm size, pest and insect incidence were statistically significant determinants of food insecurity in terms of diet quality or diversity. The researchers also found that measure the incidence; gap and severity of food insecurity were computed by using the FGT poverty index and results 84.7, 41.7 and 25.4 percent, respectively.

Ermias (2011) carried out a study on the severity and determinants of rural households' food security status: the case of Angolelanatera Woreda, North Shewa Zone, Amhara National

Regional State, Ethiopia. Using logit regression model, he found that among the explanatory variables included in the model, family size, age of household head, number of ox/oxen, use of improved seeds, total asset value, participation in credit, market distance and education were statistically significant determinants of food insecurity. The FGT results of study also found that the incidence, the gap, and the severity of household food insecurity were 78.3%, 42%, and 26%, respectively.

Mequanent (2014) carried out a study on the determinants of Household food security among Southwest Ethiopia rural Households: the case of Mana woreda of Jimma zone, Oromia National Regional State, Ethiopia. Using logit regression model, he found that among the explanatory variables included in the model, educational status of household head, family size, use of farm input and number of oxen owned by households were statistically significant determinants of food security. The FGT result of the study also found that the incidence of household food insecurity was 42.9%.

Girma (2012) carried out a study on the determinants of food insecurity among households in Addis Ababa city, Ethiopia. Using logit regression model, he found that among the explanatory variables included in the model, household size, age of household head, household head education, and access to credit, household asset possession, and access to employment were statistically significant determinants of food insecurity. The researcher also found that the incidence, the gap, and the severity of household food insecurity were computed by using the FGT as a 58.16 %, 20% and 9.4 %, respectively.

Zerihun (2012) carried out a study on the levels of household food insecurity in rural areas of *Guraghe* zone, Southern Ethiopia. The survey result showed that the calorie intake approach of the absolute head count index, the normalized calorie deficiency gap index and the square calorie deficiency gap were about 60%, 5.8% and 1.8%, respectively. The Gini-coefficient for the households was also estimated to be 0.212.

Mesfin (2012) carried out a study on the determinants of households' vulnerability to food insecurity in Ethiopia: Econometric analysis of rural and urban households. Using binary logit regression model, he found that among the explanatory variables included in the model, family sizes; lower consumption expenditure, old age households, unemployed and male heads were more food insecure in urban areas and livestock ownerships, farm inputs and farm

size, shocks such as drought and illness in rural areas were statistically significant determinants of food insecurity. The researchers also found that Food insecurity was worse in rural household with food insecurity headcount index, short-fall index and severity of 70.8%, 12% and 6.2%, respectively, than the urban counterpart of 34.1%, 6.1% and 2.5%.

Abdirahman (2015) carried out a study on the food insecurity and coping strategies of Agro-pastoral households in Babile district of Somali Regional State, Ethiopia. Using logit regression model, he found that among the explanatory variables included in the model, distance to nearest market centre, dependency ratio, cultivated land, livestock ownership, oxen ownership, remittance and off-farm income were statistically significant determinants of food insecurity. The FGT result of the study also found that the incidence of household food insecurity was 56.5%.

Tilksew (2012) carried out a study on food insecurity and its determinants among rural households: the case of Babile district, East Hararghe Zone, Oromia National Regional State, Ethiopia. Using logit regression model, he found that among the explanatory variables included in the model, Size of cultivated land, educational status of the household head, annual farm income, use of improved variety, and insect and pest infestation problem were statistically significant determinants of food insecurity. The researcher also found that the incidence, the gap, and the severity of household food insecurity were computed by using the FGT as a 57 %, 20% and 6 %, respectively.

2.10. Conceptual Framework of the Study

The conceptual framework of the study focused on the four-dimensional characterization of food security or insecurity. The four major dimensions of the food are food availability, food access, and food utilization and stability. These fourfold dimensions have a strong interlinked, where the food availability is a necessary but not sufficient condition of the food access, also the food access is a necessary but not sufficient condition for the food utilization, and stability is important dimension to all of them and affects all three physical elements (Pieters *et al.*, 2013).

Food availability at the micro-level is strongly related to the overall availability of food, which is determined by domestic food production, commercial food imports and food aid (FAO, 2006). These are in turn influenced by domestic policies regarding food production, such as policymakers' focus on food self-sufficiency or food self-reliance. Other policies directly affecting food availability are agricultural subsidy programs, exchange rate policies affecting international trade opportunities and policies creating stable and attractive conditions for agricultural investments. In general, the food availability dimension reflects the supply side (Barrett and Lentz, 2009) and will therefore be affected by all the drivers and determinants that have an impact on the domestic supply of food and the ability to finance food imports.

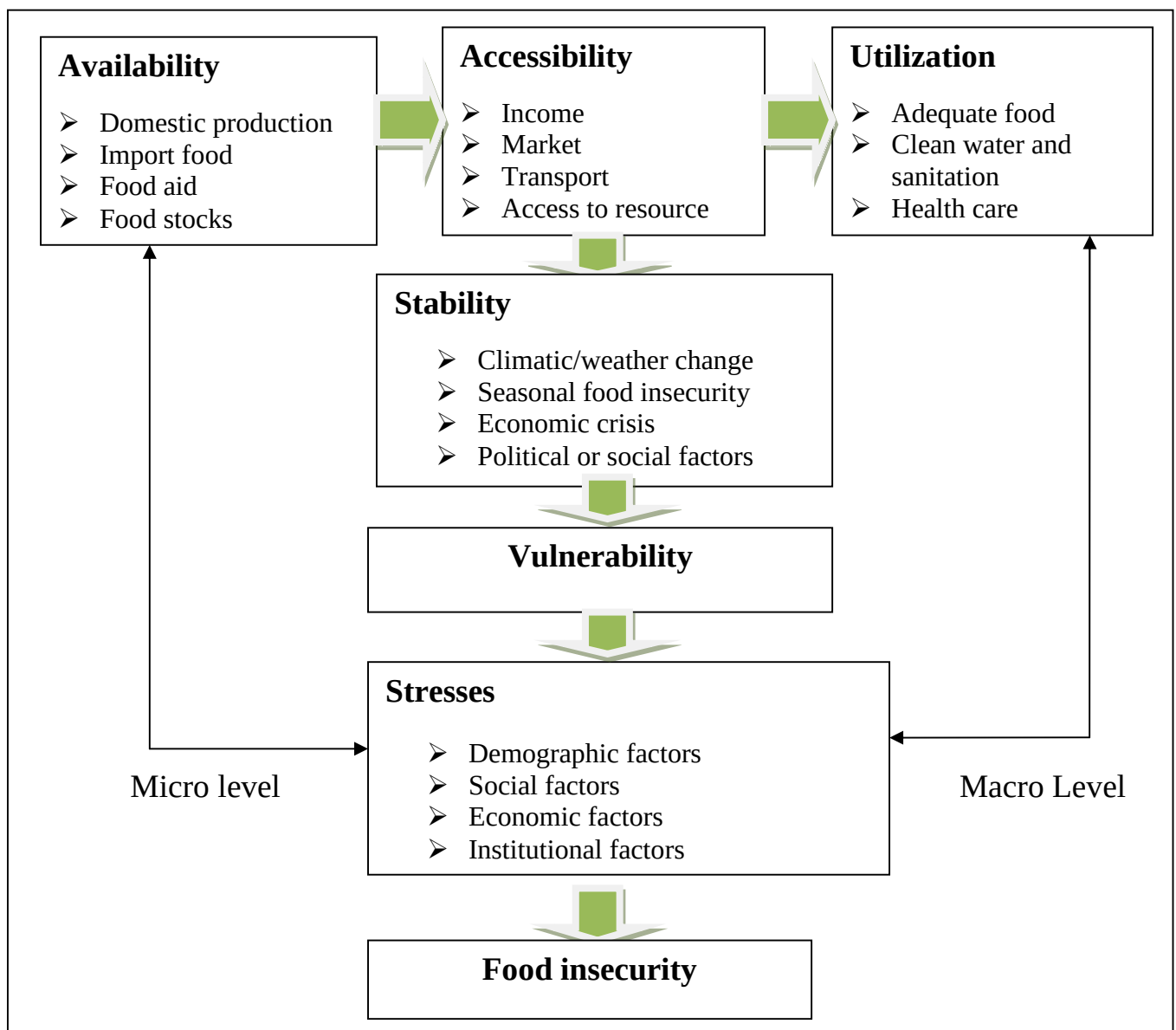
Household-level food access is considered to be achieved when a household has the opportunity to obtain food of sufficient quantity and quality to ensure a safe and nutritious diet (FAO, 2006). To realize this, not only domestic and local food availability must be realized; households must also have access to the necessary resources to acquire food. Important drivers of food access are household resources, food prices, food preferences and socio-political factors.

Food access is a necessary but not a sufficient condition to ensure an adequate food status (Barrett and Lentz, 2009). For example, a household might have access to all the necessary food products for a balanced diet, but still prefer to buy hypo- or hyper-caloric food. Banerjee and Duflo (2006) indeed document that an increase in household income does not necessarily lead to an increase in the quantity or quality of food consumed, but can be spent on items such as alcohol or fast food. Alternatively, an unequal distribution of food within the household might cause some members to eat more and others less than required. In both cases, at least some household members will not absorb the required amount of micronutrients, resulting in a poor food status.

The stability of the food security status focuses on what happens to livelihoods when households are hit by temporary negative shocks (vulnerability). Vulnerability at the level of food and nutrition security can be described as the risk that the food security status of the household is undermined by negative shocks. Households generally face multiple negative shocks over time and each shock may affect the food security status of the household. Drastic changes in these conditions, such as during periods of social factors, economic factors and

institutional factors, may seriously disrupt production strategies and threaten the food access of affected households. To the extent that these shocks often lead to the loss of productive assets such as livestock, they also have severe implications for the future productive potential of households and, therefore, their long-term food security. Therefore, failures of these above mentioned factors leads to economic, social, health and political crisis that eventually leads to food insecurity.

Figure 1 illustrates the relationship among the dimension of food insecurity elements within the conceptual framework of food insecurity



3. RESEARCH METHODOLOGY

In this chapter, brief description of the study area and methodology of the research that include sampling technique and sample size, types, sources and methods of data collection, methods of data analysis and working hypothesis of model variables are given.

3.1. Description of the Study Area

Degahbour district is found in Jarar zone of the Somali Regional State. The district is bordered in the north, in the South and South-east by Ararso and Birqod districts respectively, in the East and East-North Aware district and South-west Dhagahmadow district. Degahbour town is located at a distance of 170 Km from the regional capital Jigjiga towards the East direction. The district has a total of 11 pastoral administrative kebeles.

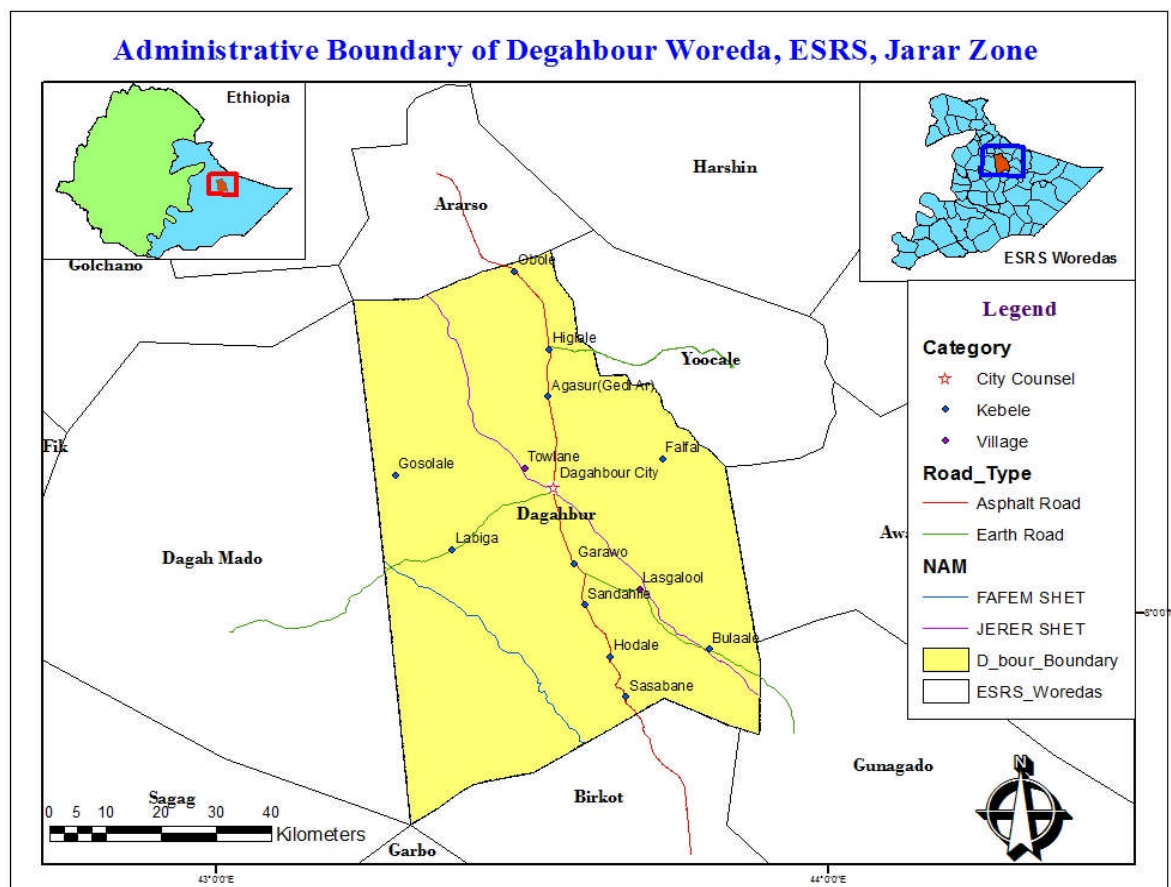


Figure 2: Location of the study area

Source: Somali Region BoFED, 2015.

3.1.1. Geographical Features

In agro-ecological terms, Degahbour district is described as a semi-arid low land the topography is dominantly featured by the mix of flat and uneven land, with many small dry rivers and with undulating hilly terrain in some parts (*doox*¹). The altitude is relatively high (350 - 400 metres above sea level) in the *dul*² areas (making them cooler across the year than other parts) and low in the *doox* areas. The area is climatically hot and dry weather prevails in most parts of the year (about seven months) though the distribution of months into wet and dry are equal (6 months each (DPPB, 2012).

The district is normally a moisture deficit district due to limited amounts of rainfall it receives through bi-annual rainfall cycles (300-400 mm per year). There are four seasons within the year, with the *gu*³ and *deyr*⁴ making the rainy seasons and *jilaal*⁵ and *hagaa*⁶ the dry spell. The *gu*, stretching from April to June, remains the major rainy season influencing all types of production and the market. The *deyr*, falling within October-December period, is a crucial complement to *gu* production, relieving the effects from the preceding *hagaa*⁶ and providing input to face the next *jilaal*. The bulk of the *gu* rains are normally received in the first two months of the season, with June bringing some light showers. The mean maximum and minimum temperature of the area is 34.4⁰c and 16.6⁰c respectively (DPPB, 2012).

3.1.2. Human Population

In 2010, the Somali Regional State parliament made administrative restructuring of district administrations of the region that increased the number of districts in the region from 52 to 68 districts, which provided the opportunity to some kebeles of Degahbour district to become an autonomous district. The new move of the regional parliament made a new shape to Degahbour district. The current estimation of Degahbour district population is 119640 which

¹ **Doox:** A low lying area, with many small and dry seasonal rivers good for livestock pasture

² **Dul :** Flat plateaus, with few rivers and mountains that are mostly dry area

³ **Gu:** Rainy season between early April and June (the main rainy season).

⁴ **Deyr:** The short rainy season of the year, usually from October - December.

⁵ **Jilaal:** Hot dry season between late December and March

⁶ **Hagaa:** Dry season between July and September

composed of 69978 (58.5%) male and 49662 (41.5%) female, 20,339.00 (17 %) are urban inhabitants 99,301(83%) are rural inhabitants. Concerning the average household size of degahbour district, a rural household has an average size of 6.4 while the urban one has 5.2 (JZAO, 2013).

3.1.3. Livestock Population

Livestock types kept by the pastoralists in study area include; camel, cattle, sheep and goats, and equines. The total livestock population of the district consists of 506,193 out of these 210,322 are Goat, 9,658 are Cattle, 161,429 are sheep, 5,994 are Donkey, 118,790 are Camel. Livestock plays a significant role in the pastoral production system in the study area. Camels are kept for milk, sale and for transportation, cows provide for pastoral households with milk and butter for consumption and sale, donkeys for transporting goods, while sheep, goats are mainly kept for sale as well as for their meat. The feed sources commonly used for livestock include natural grazing and crop residues. Livestock are the major source of livelihood for the population of Somali region. Eighty five percent of the population in the region dwell in the rural areas and are either pastoralists who mostly depend on livestock rearing or agro-pastoralists which have mixed livestock and crop production system (SLCRDB, 2011).

3.1.4. Sources of Income

The main income source for pastoral groups is livestock sales (often making up to 50% or more of the total income). Poorer households usually have no more diversified income sources as they have too few livestock and can ill-afford to sell them. Ghee sales, particularly for cattle-rearing pastoralists are also a source of income. Milk is sold by pastoralists only when they are near settlements or near permanent water points during the dry seasons. Normally most pastoral groups just consume their milk as access to markets is difficult. Other sources of income, particularly among the poor, are the collection and sale of construction materials, firewood, charcoal, gums and resins and engagement in unskilled labour activities such as working in tea shops and livestock herding for the richer households. Again most of these opportunities are more available to those living near towns, which provide the demand. Payment for herding may be given in kind. In the drier seasons water is sold, particularly in *berkad*-dependent areas. Other incomes include a number of income sources that varied from one poor household to the next in the reference year. It includes remittances, gifts and loans

from relatives on the one hand and charcoal production and casual labour on the other. Households that receive large amounts of remittances and gifts were under less pressure to engage in labour-based activities, and vice versa (SLCRDB, 2011).

3.2. Types, Sources and Methods of Data Collection

Both qualitative and quantitative types of data were collected from primary and secondary sources. Primary data were collected using structured questionnaire, key informants' interview, focus group discussions and observation.

To complement the primary data, relevant secondary data were collected from Degahbour District Agricultural Office, Administration office, Health Office, Water Office, Somali Regional State Line Bureaus, NGOs and Organizations operating in the district. Published and unpublished documents have extensively been reviewed to secure pertinent information.

For the data collection, four college graduate enumerators who speak the local language fluently were recruited from the study area and they were trained. During the data collection phase, the researcher was supervising the enumerators. The filled-in questionnaire was thoroughly checked every day for the completeness and for possible re-interview if deemed necessary. Furthermore, in order to generate adequate data and examine the socio-cultural practices/attitudes, the study was supported by the qualitative data obtained from key informants' interview and focus group discussion.

3.3. Sample Size Determination and Sampling Procedure

Two-stage sampling procedure was used to select sample households for this study. At the first stage, four pastoral kebeles were selected randomly from the total of 11 pastoral kebeles in the district. In the second stage, the pastoral households in the four kebeles of Degahbour district were listed and from the list of these pastoral households representative sample pastoral households were selected using probability proportional to size.

The existing literatures like (Cochran, 1963; Yamane, 1967; Schulz, 2005; Kirby, 2002; Eng J., 2003) debate the issue of successful selection and meaningful sample-size. Determination

of sample size varies for various types of research designs and there are several approaches in practice. Sample size determination is an important element in any survey research, although it is a difficult one. A simplified formula for proportions developed by Yamane (1967) was used in this study. Accordingly, Yamane (1967) provides a simplified formula to calculate sample size.

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

Where

n is the sample size,

N is the population of pastoral households in the district, and

e is the level of precision.

According to the last estimates of Somali Regional government, Regional DPPC and Degahbour district administration of 2016 the total population of the newly revised Degahbur district is roughly estimated to be 119640 of which 69978 (58.5%) are male and 49662 (41.5%) are female, while the rural and urban population are 99,301 and 20,339 respectively. The average family size for rural and urban areas is 6.4 and 5.2 persons respectively. Based on this, the district has around 15,516 households. A 95% confidence level an variability of 0.05 base on Yamane's simplified formula; e = 0.09 and N= 15516 are inserted into the equation (1) to get:

$$n = \frac{15516}{1 + 15516 (0.09)^2} = 123 \quad (2)$$

Then according to Yamane (1967) formula the sample size of 123 pastoral households has been selected randomly from the selected four pastoral kebeles. After having the total number of households in each of the four pastoral households' probability proportional to size was employed to determine the sample households from the four pastoral kebeles. Accordingly, the selected 123 sample households were interviewed by using semi-structured questionnaire.

Table 2: Sample distribution in the sampled pastoral kebeles

Pastoral Kebeles	Total number of pastoral households	Sample household
<i>Geedi-Aar</i>	1270	34
<i>Sasabane</i>	1182	32
<i>Garawo</i>	1200	32
<i>Sandaxiile</i>	910	25
Total	4562	123

Source: Field survey, (2016).

3.4. Methods of Data Analysis

3.4.1. Descriptive Statistical Analysis

Descriptive and inferential statistics like percentages, ratios, mean, frequencies, and the like were used for comparison of factors between food secure and food insecure households in the study area based on the socio-economic, institutional and demographic factors.

3.4.2. Measuring Food Security Status of the Households

Household caloric acquisition is a measure of the number of calories, or nutrients available for consumption by household members over a defined period of time. The principal person responsible for preparing meals were asked how much food was prepared for consumption from purchase, stock and/or gift/loan/wage over a period of time. In this study, a seven-day recall method was used since such a measure gives more reliable information. According to Bashir (2010), these seven days recall period was selected due to the fact that 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.

After that the collected data using seven days recall method, was converted to kilocalorie using the food composition table manual (EHNRI, 1997). In order to calculate the households' daily caloric intake, the total households' calorie intake for the last seven days

was divided by seven. The household's daily caloric intake per adult equivalent (calorie per AE per day) was 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. Then the results were compared with the minimum subsistence requirement per AE per day at 2,200 Kcal which is set by the Ethiopian Government (FSS, 2002).

Hence, for this study 2,200 Kcal per adult equivalent (AE) per day was employed as a cut-off point between food secure and insecure households. Beyond which the household is said to be food secure and if below, food insecure.

This measurement has its own strengths and weakness. It produces a crude estimate of the number of calories available for consumption in the household; the level of skill required by enumerators is less than that needed to obtain information on individual intakes (Hoddinott, 1999). In addition, the diet quantity indicators are closely related to the notion of access to food by people, a fundamental component of the definition of food security (Smith, 2007). Set against these advantages, there are some disadvantages. It generates a large quantity of numerical data that needs to be carefully checked both in the field and during data entry, and data processing requirements are also higher (Hoddinott, 1999). Besides, energy from food is arguably the most important nutrient for survival, physical activity, and health, and households are the units through which people generally access food (Smith, 2007).

3.4.3. Incidence, Food Insecurity Gap and Severity

Several researchers used the FGT model to analyze the incidence, food insecurity gap and severity of food insecurity, for example, (Tilaye, 2004; Zerihun, 2012; Girma, 2012; Adisie, 2016; Mesfin, 2012).

The FGT model can be expressed as follows:

$$P(\alpha) = \frac{1}{n} \sum_{i=1}^q \left[\frac{m - y_i}{m} \right]^\alpha$$

(3)

n : is the number of sample households

y_i : is the measure of per adult equivalent food calorie intake of the i^{th} household

m : represents the cut-off between food security and insecurity (2,200 kcal per adult equivalent)

q : is the number of food insecure households

α : is the weight attached to the severity of food insecurity

Here, the parameter α is the aversion parameter that takes values of zero, one or two (weighted attached to food insecurity). If α equal to zero, FGT (0) is the head count index measuring the incidence of food insecurity. That is, the proportion of households living below the food security line out of the total sample households. The head-count index is easily understood and communicated, but it is insensitive to differences in the depth/intensity of food insecurity. It fails to capture the extent to which households' daily calorie intake per AE falls below food insecurity line. Setting α equal to one, FGT (1) is the food insecurity gap ratio, measuring the depth of food insecurity. That is, on the average, how far the food insecure is far from the food security line. In other words, we get the normalized food insecurity gap or it estimates the total resources needed to bring all the food insecure to the level of the food security line. The downside of the food insecurity gap measure is that it does not capture the differences in the severity of food insecurity among the poor, that is, it does not capture the transfer of income among the poor. If α equal to two, then FGT (2) is the severity of food insecurity among households, the squared proportional shortfalls from the food security line. That is known as an index of the severity of food insecurity. However, it is not easy to interpret (Foster *et al.*, 1984; Todaro and Smith, 2010).

3.4.4. Econometric Model Analysis

In most of econometric literature such as for estimating binary choice models the linear probability, logit and probit models are the possible alternative models and have been widely used for a binary response variable (Gujarati, 2003). A linear probability model is plagued by several problems such as: non-normality of the disturbance term, heteroscedasticity and the generally lower R^2 values (Gujarati, 2003). As a result hypothesis testing and constructing confidence interval become inaccurate and misleading and moreover the predicted values ($\hat{y}$) lies outside 0-1 range and violate the basic tenets of probability. The inadequacy of the LPM suggests that a non-linear specification may be more appropriate. The S-shaped curves that

cumulative distribution functions, commonly chosen to represent the 0-1 response models are the logistic and the probit models. The logit model assumes cumulative logistic probability function whereas the probit model is associated with the cumulative normal distribution (Gujarati, 1995).

Although logit and probit yield similar parameter estimates, a cumulative logistic regression model is preferred because of its comparative mathematical simplicity (Gujarati, 1995). The two functions are quite comparable or are very close in the mid-range, except in the tails in that probit function has slightly flatter tails while the logistic distribution has thicker-tailed (Gujarati, 2003). The logistic distribution tends to give larger probabilities to $Y = 0$ where X is extremely small and smaller probabilistic to $Y = 0$ where X is very large than the normal distribution. Thus, for this study the logit model was selected to answer the question which factors are influential to the food insecurity of the households in the study area.

It is used to estimate the probability of food insecurity of the household that takes either of the two values of $Y = 1$ for food insecure households and $Y = 0$ otherwise.

According to Gujarati (1995) the logistic distribution function for determining factors in food security status of the households can be specified as:

$$p_i = \frac{1}{1 + e^{-Z_i}} \quad (4)$$

Where: p_i is a probability of being food insecure for i^{th} household

e represents the base of natural logarithms (2.718) and

Z_i is a function of m explanatory variables (X_i) and is expressed as:-

$$Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_m X_m \quad (5)$$

Where β_m is the slope parameter in the model which is estimated using maximum likelihood method. The slope tells how the log-odds in favour of food insecurity of the household change as independent variables change by a unit.

The odds to be defined as the ratio of the probability that a household being food insecure p_i to the probability that food secure $(1-p_i)$.

$$(1 - p_i) = \frac{1}{1 + e^{z_i}} \quad (6)$$

$$\left(\frac{p_i}{1 - p_i} \right) = \frac{1 + e^{z_i}}{1 + e^{-z_i}} = e^{z_i} = e^{\beta_0 + \sum_{i=1}^m \beta_i X_i} \quad (7)$$

Taking the natural logarithms of the odds ratio of equation (5) will result in what is known as the logit model as indicated below.

$$\ln \left(\frac{p_i}{1 - p_i} \right) = \ln e^{z_i} = z_i = \beta_0 + \sum_{i=1}^m \beta_i X_i \quad (9)$$

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

$$Z_{(i)} = \beta_0 + \sum \beta_i X_i + u_i \quad (10)$$

The model has been estimated through iterative maximum likelihood procedure with the help of STATA software. The coefficients of the logit model presented the change in the log of the odds (food insecurity as a 0 or 1) associated with a unit change in the explanatory variables.

However, before estimating the logit model, it was necessary to check if multicollinearity exists among the variables in the model. The reason for this is that the existence of multicollinearity will affect seriously the parameter estimates. If multicollinearity turns out to be significant, the simultaneous presence of the two variables will attenuate or reinforce the individual effects of these variables. Needless to say, omitting significant interaction terms incorrectly will lead to a specification bias. In short, the coefficients of the interaction of the variables indicate whether or not one of the two associated variables should be eliminated from model analysis (Kotari, 1990).

According to Gujarati (2003) among the various indicators of multicollinearity, the Variance Inflation Factor (VIF) was used in this study to check whether there is multicollinearity or not which are used in this study, are designed VIF for both continuous and discrete variables. The variance inflation factor was computed as:

$$VIF(X_m) = \frac{1}{1 - R_m^2} \quad (11)$$

Where: X_m indicates the variables regressed on other explanatory variables.

R_m^2 indicates the coefficient of determination for each independent variable.

A rise in the value of R_m^2 that is an increase in the degree of multicollinearity, does indeed lead to an increase in the variances and standard errors of the OLS estimates. A VIF value greater than 10 (this will happen if R_m^2 exceeds 0.90), is used as a signal for existence of severe multicollinearity (Gujarati, 2003).

3.5. Definition of Variables and Working Hypotheses

3.5.1. Dependent Variable

The household food insecurity, which is the dependent variable for the logit analysis is a dichotomous variable representing the status of the household food insecurity. It is represented in the model by 1 if the household is food insecure and 0 otherwise.

3.5.2. Independent Variables

It is hypothesized that the household food insecurity at any time is influenced by the combined effect of a number of factors. The independent variables that are expected to have association with the household food insecurity were selected based on available literature and scientific research done somewhere else. Any explanatory variable having negative coefficient is expected to reduce food insecurity of the household whereas explanatory variable found to be positive will aggravate the food insecurity of the households. Therefore, the major explanatory variables expected to have influence on the household food insecurity were explained below:

Family size (FAMSZAE): This is a continuous variable that represents total family size as members of the family who live together under the same household adjusted to adult equivalent. It is an important variable which determines the pastoral household food insecurity of the study area. According to the findings of Wali (2012), family size has a

positive association with food insecurity of a household. He justified his finding that as the household size increased the number of individuals sharing the resources available in the household increased and hence positively affected food insecurity. Therefore, it is hypothesized that family size has positive association with food insecurity of the households in the study area.

Age of household head (AGEHH): This is a continuous explanatory variable designating age of the household head in years. As the household head gets older the ability and strength of the person gets weaker and this would result in low income generating capacities. Moreover, pastoralist system requires frequent mobility which is difficult for older household heads. Hence, age is expected to affect food insecurity positively (Indiris, 2012). Thus, it is hypothesized that age of the household head and food insecurity are positively related.

Dependency ratio (DEPRTO): This is the ratio of children under age of 15 and older than 64 years to total family size expressed in terms of adult equivalent. In a household where non-productive age groups are higher than adults or productive age groups, the probability of the household to be in shortage of food would be high. This is due to the fact that the working age population (active labor force that is 15-64 years) supports not only themselves, but also additional dependent persons in the family (Abebaw, 2003; Hilina, 2005; Sadik, 2012). In addition, if there are sick members of the households within study period, they are considered as dependent members even if they are in labour force age. Thus, it is hypothesized that households with large dependent individuals are deemed to be food insecure. Therefore, it is expected to be positively related with food insecurity of the household in the study area.

Total livestock owned (TLU): It is the total number of livestock holding of the pastoralist households measured in Tropical Livestock Unit (TLU). Livestock are the source of livelihood of pastoralist community in Ethiopia. Households who have better possession of livestock are expected to be less vulnerable to food insecurity, since households with more number of livestock obtain more milk, milk products and meat for family consumption (Bashir, 2010; Indiris, 2012). Therefore, it is expected that livestock holding have a negative impact on food insecurity.

Total annual income from livestock (LVKIN): It is a continuous variable measured in Birr. Households who own relatively large livestock source income per adult equivalent could be

food secure and vice versa. Larger income per adult equivalent has positive impact on the probability of being food secure or negative impact on food insecurity. 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 (Hilina, 2005). Therefore, it was hypothesized that total income from livestock sources and food insecurity to be negatively related.

Non-livestock income per annum (HH nonlivestincome): It is a continuous explanatory variable which represent the amount of various non-livestock income sources received (in cash or in kind) by the pastoralists or any of the household members in the year other than the sale of livestock and livestock products. In this regard, households who are engaged in activities like receiving income from remittance and other informal business are better endowed with additional income to meet their food and non-food requirements (Bashir, 2010; Indiris, 2012). As a result it was expected that household who managed to earn higher non-livestock income are less likely to be food insecure *i.e.* non-livestock income is expected to have a negative impact on food insecurity.

Distance from market centre (Dstmrkt): This is a continuous explanatory variable measured in terms of proximity (kilometers) to market center that 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 (Wali, 2012). Therefore, It was expected that household nearer to market centre have better chance to improve food security status than who are far from the market center (Sadik, 2012). This means that a household nearer to the market centers, in terms of kilometers, was less likely to be food insecure and higher the distance to market is more likely to be food insecure. Therefore, market distance was hypothesized to affect food insecurity positively.

Sex of the household head (SEXHH): It is a dummy variable taking a value of 1 if the household is headed by female and 0 otherwise. Household head is a person who economically supports or manages the household. It could be male or female (Bashir, 2010). Male household heads have more tendency of engaging in different activities as they are less occupied with domestic activities and this will improve their income and hence food security. In this study, it was hypothesized that female headed households have less chance to be food secure and sex is expected to have positive impact on food insecurity.

Educational status of the household head (EDSHH): It is a dummy variable in which illiterate household head take the value of 1 and literate household heads take the value of 0. As the pastoralist household head is highly influential in decision making process in the pastoralist family of the study area the educational background of household head is believed great effect food insecurity status of the household. Studies conducted by (Amaza et al, 2006; Ayantoye *et al*, 2011; Asmalu *et al.*, 2013; Bimerew and Beyene, 2014; Mequanent, 2014) indicated that education has a negative and significant effect on food insecurity. Thus, being illiterate was assumed to decrease pastoralists using information relevant to livestock and farm productivity, thereby aggravate food insecurity.

Number of livestock died due to disease incidences (LDIHH): This variable is a continuous and represents the number of livestock (in TLU) died or lost as a result of various disease incidences. Hilina (2005) found that prevalence of disease is one of the limiting factors in livestock production system of the pastoralists' society and has a significant impact in determining the pastoralist food insecurity status. Due to the limited supply of veterinary services and facilities in the study area the existence of animal disease incidences will deteriorate the livelihood of the pastoralists and it may have positive impact in aggravating food insecurity.

Pastoral conflicts (PSTRLCFHH): It is a dummy variable, household heads who affected by pastoral conflicts represented by 1 and those not affected by 0. Households in the study area sometimes face clan conflicts due to some factors such as: expansion of territory (grazing lands, rangelands and water points), livestock raiding after period's droughts or disease outbreaks, in most cases due to restriction of movements and inability to use the available pasture and water points there will be loss of livestock because of feed and water shortages. Hence, it was expected that existence of conflict in the area to aggravate the household food insecurity (Wali, 2012). As a result, it was expected that pastoral conflicts are positively related to food insecurity.

Household Social Support Received (HHSPR): is a dummy variable and explains the household social support received both in cash and in kind due to lack of liquid cash money, household did not receive any social support represented by 1 and 0 otherwise during good or bad period. Social support networks can help poor households get access to food and other

equipments without buying it. Therefore, social support receiving can contribute the households' food security status at least temporarily. Based on this, receiving of social support in any form is expected to negatively relate with household food insecurity status (Meghan, 2015; Rose, 1996; Sultan, 2013).

Table 3: Summary of variables definition, measurement and hypothesis

Variable name	Variable type	Variable definition and measurement	Hypothesis
household food insecurity status	Dummy	1 if the household is food insecure; 0 otherwise	
Family size	Continuous	Family size in adult equivalent	+
Age	Continuous	Age of household head in years	+
Dependency ratio	Continuous	Ratio of dependent to independents in the household	+
Livestock owned	Continuous	Household total livestock owned in TLU	-
Livestock income	Continuous	Household total annual income from livestock	-
Non-livestock income	Continuous	Household total non-livestock income	-
Market distance	Continuous	Distance from market centre in kilometers	+
Sex	Dummy	1 if the household is female; 0 otherwise	+
Education	Dummy	1 if the household head is illiterate; 0 Otherwise	-
Livestock lost due to diseases incidences	Continuous	Number of livestock died due to disease incidences	+
Pastoral conflicts	Dummy	1 if the household affected by conflict; 0 Otherwise	+
Household Social Support Received	Dummy	1 if the household did not receive any social support both/or in kind and cash; 0 Otherwise	-

Source: own computation, 2017

4. RESULTS AND DISCUSSION

This chapter presents the results and discussion of the study in comparison between the food secure and food insecure households based on consumption perspective that include the findings of the study, discussions on the status of food insecurity among pastoral households, food FGT indices, descriptive statistical analysis, and logit model results and findings. Finally, factors and determinants of pastoral household food insecurity status have been identified.

4.1. Food Calorie Intake

The mostly consumed food items in the district were cereal food items like maize, sorghum and wheat⁷ with very little fruit and vegetable components, livestock products like milk and meat. There are also use of sugar, salt, tea leaf and edible oil which are purchased from nearby towns. Most of cereals and other non-livestock product food items are purchased from nearby towns or they get in exchange with livestock products from local villages.

Results of the analysis of the food security status of the pastoral households based on the standard calorie intake of 2,200 kcal per adult per day, indicate that sample households, 82 (66.67%) were food insecure and 41 (33.33%) were food secure. In other words, the majority (82) were found to be unable to meet the minimum requirement of energy (Table 4).

Table 4 shows that the average food insecure household's calorie intake per adult equivalent in the study area was 2136.37 kcal which is lower than the national kilo calorie intake of 2,200. The average calorie intake of food secure households was 3107.23 kcal, which is higher than the national average.

There was statistically significant difference between food insecure and food secure households at 1 percent level ($t = 11.06$) in terms of kilo calorie intake. Thus, the study area could be regarded as food insecure given the fact that the majority 82 (66.67%) of the sampled households could not meet the nationally recommended daily calorie intake of 2,200 kcal.

⁷ Wheat is provided in form of food aid from NGOs and GO institution as a emergency response to drought effects but not local grow

Table 4: Households food insecurity status

Daily Energy Available per AE in (Kcal) per household	Food secure (n = 41)	Food insecure (n = 82)	Total (n = 123)	t-value
Maximum	3959.07	2193.81	3959.07	11.06***
Minimum	2201.65	727.29	727.29	
Mean	3107.23	1643.25	2136.37	
St. Deviation	810.26	367.87	919.13	

Note: *** Significant at 1 percent probability level

Source: Own computation, 2017.

4.2. Distribution of Food Insecurity Status in the Study Area

Results presented in Table 5 show that Garawo kebele has the highest food insecure households while Geedi-Aar kebele has the lowest food insecure households. With regard to food secure households, Geedi-Aar and Sandaxile kebeles have the highest and lowest respectively. The details of the information presented in Table 5.

Table 5: Distribution of food insecurity status of sample households by Kebeles

Category		Study area				Total
		Geedi Aar	Sasabane	Garowo	Sandaxile	
Food insecure	Count	18	21	22	21	82
	Percentage within the kebele/s	52.94	65.63	68.75	84	66.67
	Percentage of total sample	14.63	17.07	17.89	17.07	66.67
Food secure	Count	16	11	10	4	41
	Percentage within the kebele/s	47.06	34.38	31.25	16	33.33
	Percentage of total sample	13	8.94	8.94	3.25	33.33
Total	Count	34	32	32	25	123
	Percentage of total sample	27.64	26.02	26.02	20.32	100

Source: Own computation, 2017.

Furthermore, there was significant mean difference between food insecure and food secure with regard to kebele wise distribution of sampled households ($t = 2.49$, $p = 0.014$) indicating that food insecurity status among the kebele has real difference. This difference may arise from the productive resource holding such as livestock and engagement on petty trades.

Head count index and food insecurity gap of food insecurity were the indices employed to capture the incidence and intensity of food insecurity. Head count index measures the incidence of food insecurity and shows the proportion of households below the threshold level. In the study area the incidence of food insecurity was found to be 0.6667. That means 66.67 percent of the sample households could not meet the energy requirement recommended for subsistence life. In other words, head count ratio of 0.6667 for 123 sampled households means 82 (66.67%) sample households are deemed food insecure.

To identify how far the food insecure households were below the recommended daily kilocaloric requirement, food insecurity gap was calculated. Food insecurity gap provides the possibility to estimate resources required to eliminate food insecurity through proper targeting. The calculated value for food insecurity gap was found to be 0.21. This indicates that if the district administration mobilizes and distributes resources that can meet 21 percent of the kilocalorie need of every food insecure households and distribute to each household to bring up to the nationally recommended daily kilocaloric requirement level, then theoretically food insecurity could be eliminated. The average kcal intake gap needed for every household of those food insecure groups per day per adult equivalent was 406 kcal.

The total sampled households were consisting of 721.93 adult equivalents. Among the total sampled households 531.71 adult equivalents were food insecure households. Considering the nationally recommended kcal per day per adult equivalent of 2,200 kcal, a resource needed to all households to daily subsistence requirement is estimated to be 1,588,246 kcal per day. A total resource needed to push all food insecure households to daily subsistence requirement is estimated to be 1,169,762 kcal per day. The average total kcal intake gap needed to bring to food secured status the food insecure households per day per adult equivalent is 215,874.26 kcal.

Likewise, food insecurity severity index of 10% (table 6) implies severe inequality among the food insecure sampled households in the study area. Thus, it can be inferred that there is a high degree of inequality among the food insecure pastoral households in the study area.

Table 6: Food insecurity FGT indices

FGT index	Index value
Head count index ($\alpha = 0$)	0.6667
Food insecurity gap ($\alpha = 1$)	0.21
Food insecurity severity index ($\alpha = 2$)	0.10

Source: own computation, 2017

4.3. Descriptive Statistics of Variables Affecting Food Insecurity

Based on the literature review, experts and authors' knowledge about food insecurity situation of the study area, the important determinants of pastoral household food security status were identified. The identified pastoral households food insecurity determinants thought to have relationship with food insecurity were grouped as household demographic, socio-economic and institutional variables.

4.3.1. Demographic Characteristics of Pastoral Households

The demographic characteristics of pastoral households are crucial and important in the analysis of the food insecurity status determination and these demographic variables directly or indirectly affect the household characteristics in terms of income and food consumption expenditure. Indicators of household size and structure are important in that they show a possible correlation between the level of food insecurity and household composition. Household composition, in terms of household size and characteristics of its members (such as age and sex) has different economic and social effects for food secure and insecure households. These variables are presented as follows:

Sex of the household head

Sex of the household head was one of the demographic characteristics hypothesized to influence food insecurity status of pastoral households. Female-headed households were expected to be more likely food insecure compared to male headed households. The proportions of female headed households were lower within the food secure group (7.32%) than within food insecure groups (19.51%). On the other hand, out of the total female respondents the majority (84.21%) were food insecure. With regards to its relationship with food insecurity status, Fisher's exact test pointed out significant relationship at less than 1% level significance (Fisher's exact p-value = 0.002) (Table 7).

Table 7: Sex, education of the household head and food insecurity status

Variable category		Food insecurity status		Total	Fisher's exact P-value
		Food secure (n = 41)	Food insecure (n = 82)		
Sex	Male	38	66	104	0.11
	Female	3	16	19	
Educational status	Literate	10	4	14	0.002
	Illiterate	31	78	109	

Source: Own computation, 2017,

Educational status of the household head

Educational status was one of the potential explanatory variables that affect food insecurity by improving information processing capability of pastoral community. In this study, having formal education was as hypothesized to influence the food insecurity status of the pastoral households. As depicted in Table 7, among the total respondents illiterate household heads are 88.62% while the rest 11.38% were literate. The proportion of literate household heads was high within the food secure households 24.39% than within food insecure households 4.88%. On the other hand, out of the food insecure respondents 95.12% were illiterate. Moreover, the result of Fisher's exact test revealed significant at 10% level significance

differences between food insecure and food secure in terms of education (Fisher's exact p-value = 0.11) (Table 7).

Age of the household head

The mean age of pastoralist household heads in the study area was found to be 47.41 years with a standard deviation of 7.98. The younger age of the household head was 22 years whereas the older age was 68 years. According to the survey result, food insecure households are headed by older persons compared to the food secure ones which were led by relatively younger aged persons. Besides, the mean age of food insecure households was 50.61 years and that of food secure were 41.93 years with standard deviations of 6.52 and 7.84 respectively. According to the results illustrated in Table 8, there was significant mean difference between food insecure and food secure with regard to age of household heads ($t = 6.16$, $p = 0.000$) indicating that food insecure household heads were older than their counterparts.

Family size in adult equivalent

It was hypothesized that pastoral households with large family size in terms of AE are food insecure because of an imbalance between production and consumption in the household. The minimum and maximum family sizes in terms of AE were 2.95 and 13.5 respectively. According to the results shown in Table 8, the average family size (AE) of the sample households was 5.87 with a standard deviation of 1.76. The average family size (AE) of food insecure households was 6.48 while that of food secure households was 4.64 explaining significant mean difference ($t = 6.31$, $p = 0.000$) between the food secure and insecurity categories.

Dependency ratio

The average dependency ratio for the sample households was 0.53 (the ratio of working family members to the non-working or dependent members in the family) with a standard deviation of 0.11. The mean dependency ratio of food insecure group was 0.58, which is higher than the means of food secure households (0.43). The mean difference ($t = 8.90$, $p =$

0.000) was statistically significant at 1% significance level between the two groups indicating the difference real.

Table 8: Age of household head, family size in adult equivalent, household dependency ratio and the food insecurity

Variable category		Food insecurity status		Total	t-value
		Food secure	Food		
		(n = 41)	insecure (n = 82)		
Age	Mean	41.93	50.61	47.41	6.16***
	Std	7.84	6.52	7.98	
Family size (AE)	Mean	4.64	6.48	5.87	6.31***
	Std	0.79	1.78	1.76	
Dependency ratio	Mean	0.43	0.58	0.53	8.90***
	Std	0.07	0.10	0.11	

Source: Own computation, 2017, *** significant at 1 % probability level

4.3.2. Socio-economic Characteristics of the Sample Pastoral Households

Apart from the daily required kcal per adult equivalent – which is typically used to define whether a household is food insecure or not – there are many other economic characteristics that correlate with food insecurity, most notably household employment, property and other assets owned by the household. There are also several social indicators that are correlated with food insecurity.

The livelihoods of majority of pastoralists in Degahbour district are less diversified. Pastoral households in the district pursue two livelihood activities – rearing livestock (especially camel, sheep and goats, but also cattle, especially in the western valleys of the district) as well as a minor income-earning activity like charcoal burning, petty trading and drinking tea making shop, or collecting firewood or construction materials for sale. The socio-economic characteristics of the sampled households are discussed below:

Livestock owned per adult equivalent

The livestock ownership is an indicator of household's wealth and social status in pastoral community. Besides, it is the main source of food, income, draft power, live asset, social security and means of livelihood diversification (coping mechanism during drought and hardship seasons) for pastoralists in the district. Results show that the average TLU for sample pastoral households was 13.57 with a standard deviation of 6.27. The mean TLU for food secure group was 16.88 and the mean TLU of food insecure group was 11.92 is lower than the food secure group by 4.96. The mean difference was highly significant at 1% probability level between food insecurity status categories ($t = 4.45$, $p = 0.000$) (Table 9).

Table 9: Livestock holding, livestock diseases incidence, livestock income, non-livestock income and food insecurity

Variable		Food insecurity status		Total	t-value
		Food	Food		
		secure	insecure		
		(n = 41)	(n = 82)		
Livestock	Mean	16.88	11.92	13.57	4.45***
Holding	St.dev	9.44	2.62	6.27	
Livestock died	Mean	3.23	5.03	4.43	7.3***
due to disease	St.dev	1.14	1.36	1.54	
(TLU)					
Livestock	Mean	2519.16	1007.10	1511.12	8.97***
income	St.dev	1326.34	540.78	1132.78	
Non-livestock	Mean	1365.14	575.05	838.42	5.74***
income	St.dev	495.30	288.66	408.44	

Source: own computation, 2017, *** significant at 1% probability level

Income from Livestock

In this study, livestock and its products are the major source of income for pastoral households. The average annual livestock income of the sample household was 1511.12 birr with standard deviation of 1132.78. The minimum and maximum livestock income were

158.10 and birr 6950.50 respectively. Households whose incomes are very small did not sell livestock products rather use it for home consumption. Additionally, on average food secure households had higher livestock income per AE (2519.16 birr) as compared to food insecure group (1007.10 Birr). Analysis of mean comparison has confirmed the existence of significant mean difference between food secure and insecure sample respondents in their livestock income per AE ($t = 8.97$, $p = 0.000$) at less than 1% probability level (Table 9).

Non-livestock income

In the study area includes gift, donations, charcoal making and some very small daily wage employment were found to be the major non-livestock activities that sample respondents engaged in. In Table 9, the average non-livestock income per AE for the sample households was 838.42 birr with standard deviation of 408.44. The minimum and maximum non-livestock income was found to be 0 and 7341.3 birr.

Mean comparison results indicate that on average food secure households Birr (1365.14) had better non-livestock income per AE than food insecure households (575.05). The test in Table 9 revealed that there was significant mean difference between food secure and insecure ($t = 5.74$, $p = 0.000$) at 1% probability level in terms of non-livestock income (Table 9).

Livestock diseases incidence in a year (Measured in TLU)

Prevalence of livestock diseases, shortage of feed and their interaction constitute important constraints to livestock production of the pastoralist areas. There are some common livestock diseases in Degahbour district that directly or indirectly affects the livestock population, production and productivity.

These common livestock diseases are categorized based on causes of the diseases into viral, bacteria, fungi and parasites etc. the public veterinary service facility available to the community has been very poor both in terms of coverage and quality. It was hypothesized that existence of animal disease incidences will decrease the well-being of livelihood of the pastoralists and it will have positive impact in aggravating food insecurity.

The field survey data indicates that the average number of livestock lost due to different types of diseases per TLU of sampled pastoralists was 4.43 with the standard deviation of 1.54. The minimum and maximum number of dead livestock in TLU was 0.39 and 8.45 respectively. On average food secure group had lower number of livestock dead in TLU which was 3.23 as compared to food insecure group 5.03. Analysis of mean comparison has confirmed the existence of significant mean difference between food secure and insecure sample households in the number of lost livestock in TLU ($t = 7.3$, $p = 0.000$) at less than 1% probability level (Table 9).

Furthermore, According to focus group discussion, key informant interview and sampled pastoral households, the major cause of economic losses and low productivity of livestock is a widespread prevalence of different diseases and parasites. According to the results obtained from FGDs, key interview and sampled pastoralist households, the major killer animal diseases found in the study district include: Peste des petits (PPR), Contagious Bovine Pleuropneumonia (CBPP), Contagious Caprine Pleuropneumonia (CCPP), shoat box, hemorrhagic septicaemia, foot and mouth disease (FMD), camel pox, external and internal parasites (Table 10). The livestock diseases are ranked based on their prevalence and spread through focus group discussion and key interviews by using simple rating.

Table 10: Local names of major livestock diseases

Number	Local term	Disease name	Prevalence (ranking)
1	<i>Furuqa geela</i>	Camel pox	9
2	<i>Furuqa adhiga</i>	Sheep and goat pox virus (SGPV)	2
3	<i>Sanbab xaar/ kaligii cune</i>	Peste des petits ruminants (PPR)	1
4	<i>Sanbabka lo'da</i>	Contagious bovine Caprine Pleuro Pneumonia	8
5	<i>Sanbabka adhiga</i>	Contagious Caprine Pleuro Pneumonia(CCPP)	3
6	<i>Cabeeb</i>	Foot and mouth disease (FMD)	11
7	<i>Cunabarar/ guux</i>	Pasteurellosis	4
8	<i>Dulan ama daris ku nool</i>	Ectoparasite infection	10
9	<i>Kudka</i>	Anthrax	5
10	<i>Guur buurka ama kuus kuuska Lo,da</i>	Lumpy skin disease (LSD)	7
11	<i>Garab-gooye ama iitayse</i>	Blackleg	6

Source: Own Survey, 2017.

4.3.3. Institutional Characteristics

In general, institutions and organizations are important aids to development. They may affect agricultural and rural development in many different ways, including provision of production inputs and services, reduction of transaction costs, enhancement of bargaining power of pastoralist vis-à-vis those to whom they sell their produce and from whom they buy production inputs and services, influencing investments and savings that expected to reduce the extent of food insecurity level in the society.

Distance to market place

Markets play a vital role in pastoral communities as source of cash and a place for sale of their livestock and livestock products. If the input-output market is closer, pastoralists can

have access to information, reduce cost of production and transaction, can easily purchase necessary food and non-food items for their families and display their livestock at fair price with good margin. The district has one common livestock market at Degahbour town, the capital city of the district.

In the study area, pastoralists used to go a minimum and a maximum of 11 km and 55 km from their residence to reach the nearest market center, respectively. On average, they have to travel 26.33 km to reach the nearest market center to sell their products and/or buy other basic needs. Food secure and insecure groups travelled on average 22.02 km and 28.48 km respectively to reach nearest market. Similarly, the mean time required to reach the nearest market center was found to be 263.3 minutes. Analysis of mean comparison has not confirmed the existence of significant mean difference between food secure and insecure sample households in the number of lost livestock in TLU ($t = 0.75$, $p = 0.257$) (Table 11).

Table 11: Market distance and household food insecurity

Variable name			Food insecurity status		Total	t-value
			Food secure	Food insecure		
			(n = 41)	(n = 82)		
Distance	to	Mean	22.02	28.48	26.33	0.75
Market (Km)		Std	11.86	12.76	12.79	

Source: own computation, 2017

Conflicts

Households in the study area sometimes faced minor conflicts due to factors such as: control over water points, control over pasture lands, and livestock raiding after periods of droughts or disease outbreaks. The areas in which most of these conflicts occurred were Geedi-Aar, Garawo and Sasabane *kebeles* in Degahbour district. The effects of these conflicts were loss of livestock and loss of household assets. Survey result indicated that 30.89% of the sample household heads (25.20% from the food insecure and 5.69% from the food secure) were affected by pastoral conflicts while 69.11% of the sampled households (41.46% of the food insecure and 27.64% of the food secure) were not affected by pastoral conflicts (Table 12).

The result also showed that there was no significant proportion difference between the food secured and insecure households in terms of pastoral conflicts.

Table 12: Pastoral conflicts and household food insecurity

Pastoral Conflict	Food Secure		Food Insecure		Total		χ^2 -value
	Number	Percent	Number	Percent	Number	Percent	
Not affected	34	27.64	51	41.46	85	69.11	0.56
Affected	7	5.69	31	25.20	38	30.89	
Total	41	33.33	82	66.67	123	100	

Source: Own survey, 2017.

Social support received

The focus group discussion with key informants indicated that Somali community support poor families through temporary and permanent mechanisms of restocking and feeding through social support networks which is based clan and kinship relations. In the Somali pastoral community, there is vast land that they move and live together for about 10-15 families residing in the same places. They move and live in group and supports each other for mutual benefits. Somali pastoralists have long year's tradition of social networking system that warrants the households to maintain sustainable livelihoods that supports poor and destitute family in the community through different mechanisms such as *Zakat*⁸ (religious alms), *Kaalo*⁹ (in form of livestock or cash) for married couples, *Xolo-goyo*¹⁰ - provision of commonly owned family livestock/assets to sons (specially married son), *Irmaans*¹¹ - temporary lending of milking livestock (especially camel) to poor relatives only for milking purpose and after lactation period the livestock will be returned back and *Xirsi*¹² - for poor family some milk donations are given on daily basis especially camel lactating times

⁸ **Zakat**: Third Pillar of Islam, an obligatory redistribution system whereby the better-off provide support to the poor in cash or in kind for instance in the case of pastoralists (Livestock)

⁹ **Kaalo**: gift of livestock to newly married couples.

¹⁰ **Xoolo-gooyo**: restocking of poorer relatives families in form of livestock

¹¹ **Irmaansi**: animal loaned to a relative families for milking purpose for a certain period

¹² **Xirsi**: Milk gift to relative families who do not having milking livestock on daily basis

(morning and evening time) every day. Sometimes *Xirsi* is made for guests and visitors of the family. In addition, there is also social support in the form of labour for livestock herding and husbandry practices *xoolo- uraacid*¹³, access to water *Balalo*¹⁴ and pasture, participation in public events. However, as stated by key informants this social support tradition is getting weaker and diminishing over the recent years owing to the depletion of the size of livestock due to recurrent drought and the increasing number of the poor needing the support.

Survey result also indicated that 61.79% of the sample household heads (32.52% from food insecure and 29.27% from food secure) received social support both in kind and cash while 38.21% of the sampled households (34.15% from food insecure households and 4.07% from food secure) did not received any social support (Table 13). The result also showed that there was significant proportion difference between the food secured and insecure households in terms of household social support received at 1% level of significance.

Table 13: Received Social support and households' food insecurity status

Social support received status		Food Secure		Food Insecure		Total		χ^2 -value
		Number	Percent	Number	Percent	Number	Percent	
Not received social support		5	4.07	42	34.15	47	38.21	15.85***
Received social support		36	29.27	40	32.52	76	61.79	
Total		41	33.33	82	66.67	123	100	

Source: Own survey, 2017, *** significant at 1% probability level

4.4. Econometric Model Results

As specified in the methodology part of this research, the analysis of the determinants of food insecurity status was made using binary logistic regression model. In this section, this model was used to see the influence of demographic, socio-economic, and institutional variables on households' food insecurity status. Descriptive statistics alone results are not enough to

¹³*xoolo- uraacid*: labour support for poor relative families in terms herding animals

¹⁴*Balalo*: labour support for poor relative families in terms watering animals

stimulate policy actions unless the influence of each factor is known for priority based intervention.

4.4.1. Diagnostics of the Econometric Model

Before analyzing the model result, the multicollinearity test of explanatory variables was carried out by using Variance Inflation Factor (VIF) diagnostic technique.

Multicollinearity test

Multicollinearity refers to the case in which two or more explanatory variables in the regression model are highly correlated, making it difficult or impossible to isolate their individual effects on the dependent variable. With multicollinearity, the estimated OLS coefficients may be statistically insignificant (and even have the wrong sign) even though R^2 may be “high.” The presence of the multicollinearity among explanatory variables was tested using VIF (Variance inflation Factor) for all variables as shown in the (Table 14).

Table 14: Multicollinearity test using VIF test

Variable	VIF	1/VIF
Age	1.35	0.741
Sex	1.21	0.826
Education level	1.18	0.847
Family size (AE)	1.43	0.699
Dependency ratio	1.29	0.775
Livestock holding	1.45	0.69
Livestock income	1.73	0.578
Non-livestock income	1.42	0.704
Conflicts	1.15	0.87
Livestock lost due to disease	1.13	0.885
Household social support received	1.33	0.752
Distance to market	1.17	0.855
Mean VIF	1.32	

Source: own computational result, 2017.

As a rule of thumb, if the VIF of a variable exceeds 10, which will happen if R^2 exceeds 0.90, that variable is said to be highly collinear as stated Gujarati (2004). However, in the current study as can be seen from Table 14 none of the variables have VIF value of 10 and above which is an indication that there is no serious problem of multicollinearity among all variables of this study.

4.4.2. Determinants of Pastoral Households' Food Insecurity Status

This section presents and discusses empirical findings of econometric model analysis. Estimates of the parameters of the variables expected to determine the pastoral food insecurity status are presented in Table 15. The goodness-of-fit was tested using the Log likelihood ratio (LR) test. The result shows the chi-square of 130.26 with 12 df and p-value of zero. This means that it is statistically significant and the model displays a good fit. The Pseudo- R^2 of the model is also 65.45%. This verifies that the model has a good fit to the data and explained significant at most of explanatory factors influencing food insecurity.

Among the total of twelve explanatory variables included in the model, nine variables were found to be statistically significant in influencing food insecurity status while the remaining three explanatory variables were statistically insignificant in explaining the food insecurity status of pastoralists in the study area at the conventional level of significance (*i.e.* $P < 0.1$). Among factors which had significant influence on food insecurity status family size, dependency ratio, livestock ownership, livestock income and non-livestock income were statistically significant at 1% probability level; age of the household head, sex of household head and household social support received were statistically significant at 5% probability level; livestock disease incidence was significant at 10% probability level.

Table 15: Logit model estimates of determinants of food insecurity

Variable	Coefficients	Standard . Error	z-value	Marginal effect
Family size	0.164***	0.017	2.35	0.042
Dependency ratio	0.135***	0.019	3.95	0.161
Age	0.245**	0.132	2.85	0.055
Sex	0.317**	0.224	2.65	0.039
Education	2.793	0.164	0.87	0.097
Livestock income	-0.007***	0.014	-2.95	-0.056
Non-livestock income	-0.003***	0.006	-3.50	-0.024
Livestock holding	-0.136***	0.125	-3.65	-0.323
Pastoral conflicts	1.530	2.125	0.16	0.018
Livestock disease incidence	0.383*	1.062	-1.48	0.015
Household social support received	-0.154**	2.245	-2.65	0.064
Distance to market	2.561	0.362	0.82	-0.027
Constant	0.423	1.35	0.13	
Number of observations	123			
LR chi2(12)	130.26			
Prob > chi2	0.000			
Log likelihood	-8.1594			
Pseudo-R ²	0.6545			

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

Source: Model output, 2017.

Family size: This variable was found to be statistically significant at 1 percent level of significance and has positive relation with the household food insecurity. The positive sign shows that a probability to be food insecure increases as household size in adult equivalent increases. The marginal effect shows that, other variables remaining constant, a unit increase in family size increases the probability of being food insecure by 0.042. The possible explanation is that households with large number of family members could face the probability of food insecurity as a result of sharing available limited resources. This result is also in line with the result of Abebaw (2003) and Sadik (2012) who found that total household size has a positive impact on the likelihood of falling into food insecurity.

Age of the HH head: This variable was found to be positive and significant at 5 percent probability level. This means that, an increase in the age of the household head increased the likelihood of the household to be food insecure. The marginal effect for age of household head implies that, other things being constant, the probability of being food insecure increases by 0.055 as age of the household head increases by one year. The possible explanation for this would be the more the household head gets older, the less labor force the household has to carry out livestock production and other income generating activities causing vulnerability to food insecurity. This result is supported by Bashir (2010) and Indiris (2012).

Dependency ratio: This variable was found to have significant positive effect at 1 percent probability level in determining the household food insecurity. The positive sign indicates that being food insecure increases as dependency ratio increases. The marginal effect shows that, by keeping other variables constant, the probability of being food insecure for a household increases by 0.161 as the proportion of the dependent age groups (<15 to >65 of age) increases by one unit. The way of life in the pastoral areas promotes large family size which could expose the family to have high dependency ratio and possibly be food insecure than those who have small family size who could have low dependency ratio. This result is in agreement with the findings of Abebaw (2003), Hilina (2005) and Sadik (2012).

Livestock holding (TLU): This variable was significant at 1 percent probability level and has negative association with household food insecurity. The negative relationship indicates that the probability of being food insecure decreases as the household's ownership of livestock increases. This is possibly because livestock is an important asset and source of income and food for the pastoral households. The marginal effect for total livestock holding indicates that, other things being constant, the probability of being food insecure decreases by 0.323 as the total livestock holding increases by one unit expressed in TLU. This result is supported by Bashir (2010) and Indiris (2012).

Non-livestock income: It was hypothesized that this variable has a significant contribution to household income hence negatively associated with food insecurity. The finding indicates that the variable, as expected is negatively and significantly related to food insecurity. The significant negative direction of influence with the marginal effect -0.024 is significant at 1%. Households with non-livestock income sources have a better chance of escaping out of food

insecurity and an additional one birr income from these sources reduces the probability of household falling into food insecurity by a factor of 0.024. This is consistent with the findings of Bashir (2010) and Indiris (2012). The more the non-livestock income of the household earns the lower food insecurity levels and is more likely to become better off over a period of time.

Livestock income: The livestock income refers to total annual earnings of the family from sale of livestock and livestock by-products per adult equivalent. This can be used to purchase consumable goods (like food, cloth, sugar, and others) and also to fulfill social financial obligations. Thus, generating higher livestock income per adult equivalent might reduce the probability of being food insecure. As expected, the model result shows (significant and negative relation at 1% of probability) with being food insecure of households. A one Birr increase in livestock income reduces the probability of falling into food insecurity by 0.056. This is consistent with the findings of Hilina (2005) and Sadik (2012). The more the livestock income households earning the lower the food insecurity levels and is more likely to become better off over a period of time.

Sex of household head: Sex of the household head is found to have significant positive effect at 5% probability on food insecurity status of the household. This implies that female headed households are more likely to be food insecure than male headed households. The possible explanation was the differential access to production resources where male had more access and utilization of production resources than females may lead to that male headed household may escape out of food insecurity than the female headed ones. The marginal effect of sex head indicates that, other factors being constant, the probability of food insecurity increases by a factor of 0.039 in favor of male heads. The possible explanation may be that with regard to livestock rearing experience females were not in a better position than the male herders. This is consistent with the findings of Bashir (2010). The female headed households are more likely to be food insecure than their male counterparts.

Livestock lost due to disease incidence in a year: This variable was continuous and represented the number of livestock (in TLU) died or the amount of animals lost per adult equivalent as a result of various disease incidences. This variable was significant at 10 percent probability level and has positive association with household food insecurity. The positive relationship indicates that the probability of being food insecure increases as the

number of household's livestock dead increases. The marginal effect for total livestock dead indicates that, other things being constant, the probability of being food insecure increases by 0.015 as the total number of livestock dead increases by one unit expressed in TLU. This is consistent with the findings of Hilina (2005).

Household Social support received: Receiving social support is a risk minimizing strategy that have been adopted by pastoralist community in order to develop resilience after sustaining the calamities of the recurrent drought at household level. This variable was found significant at 5 percent probability level and has negative association with household food insecurity. The negative relationship indicates that the probability of being food insecure decreases as if households received social support both in kind and cash. The marginal effect for total received social support indicates that, other things being constant, the probability of being food insecure decreases by 0.064 with a unit increase in social support. This is consistent with the findings of Meghan (2015).

5. SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Summary

Food insecurity is a reality for hundreds of millions of people around the world, with the most affected countries being those in Sub-Sahara Africa. In Ethiopia, the problem of food insecurity is worsening in pastoral areas due to the influence of socio-economic and environmental factors. Previous studies in the area were limited in identifying important factors triggering pastoralists' livelihoods drop-outs and food insecurity for well-informed policy making and building better-strategies and interventions to deal with food insecurity. Hence this study was carried out in Degahbour district of Somali Regional State with specific objectives of measuring the magnitude of food insecurity, estimating the status of food insecurity of the pastoral households and identifying its determinants among the pastoralists in the study area. To accomplish these objectives, cross-sectional data on demographic, socio-economic and institutional characteristics, livestock production and access to productive resources were collected from 123 households that were drawn from four randomly selected sample pastoral Kebeles. The data were collected through structured interview schedule and focus group discussion.

Descriptive statistics and logistic regression model were used to analyze factors associated with food insecurity status of the sampled households. Results of descriptive analysis showed the existence of a significant mean difference between food secure and insecure categories and this was explained by their differences in family size, age of the household head, dependency ratio, educational status, livestock holding measured in TLU, livestock income, non-livestock income, number of livestock dead and social support received in the study year at various level of probability. The statistical significance gave a strong ground to study sample households in terms of their food insecurity status and the factors considered. The national average daily food energy per adult equivalent estimate of 2,200 kcal was used to classify the pastoralists as food insecure and food secure and results of analysis indicated that 66.67% of the respondents were food insecure and the remaining were food secure.

On the other hand, the status and intensity of food insecurity among food insecure households were calculated based on FGT model. The study found that the head count or

food insecurity incidence, food insecurity gap and food insecurity severity were 0.6667, 0.21 and 0.10 respectively.

Finally, results of the econometric model indicated the influence of different variables on household food insecurity. A total of twelve explanatory variables were included in the model out of which nine variables had shown significant relationship with food insecurity. Accordingly, livestock income, non –livestock income and livestock holding (measured in TLU/AE) and household social support received were found to have negative and significant influence on food insecurity. On the contrary, family size (in AE), age of the household head, sex of the household head, dependency ratio and number of dead livestock had significant and positive relation with food insecurity status.

5.2. Conclusion

To estimate the magnitude of pastoral households' food insecurity in the study area; and FGT model was used to calculate the magnitude of food insecurity status of the sampled pastoral households. the result found that the head count or food insecurity incidence, food insecurity gap and food insecurity severity were 66.67%, 21% and 10% respectively that means 82 out of the 123 sampled households were found to be food insecure.

From the result of the descriptive statistics and econometric model used to analyze the determinants livestock income, non –livestock income , livestock holding (measured in TLU/AE) and household social support received were found to have negative and significant influence on food insecurity The fact that pastoralists, which are the majority in Dagabur district heavily rely on livestock production as their main livelihood basis is reflective of the importance and the pressing need for developing the livestock sector to realize its potential. Such development would enable them to take advantage from this greater potential and ultimately improve their food security, both through earning of better income from livestock and livestock product sales and through its direct impact on individual nutrition via the consumption of milk, milk products and meat by household members, especially children

Fertility is another factor aggravating food insecurity at household level. Dependency ratio and family size were found to be major problems in the study area. These are challenging factors in the pastoral households' food security environment as they

negatively affect their survival capacity. If these and other factors are therefore not addressed in the medium term, food insecurity in the study area will remain unchanged . Therefore, this study advocates that food insecurity could be substantially reduced in all of its dimensions through appropriate interventions. This can be achieved if government as well as NGOs' efforts are harmonized and directed in proper manner by addressing the root causes of this human tragedy.

5.3. Recommendations

Based on the findings of the study, the following policy recommendations are possible areas of intervention which might help mitigating the problem of food insecurity in the district.

1. In view of the positive impact of large family size and dependency ratio on the household's food insecurity in the study area, pastoral households should be educated on the need to adopt the family planning techniques so that they may bear the number of children which their resources can accommodate. Surely, educated women are more open to discussion with their spouses on family planning issues so as to reduce average family size and hence the total population. This would help in matching the available resources with the number of people and thereby contribute to improving the overall food security and the general well-being of the entire family and the hence the population. Since the pastoral communities are Muslims, natural birth control and other alternatives should be carefully assessed by considering the cultural and religious aspects of family planning.

2. Age of the household head has positive impact on food insecurity. This means old household heads are more likely to be food insecure. Therefore, because of frequent mobility nature of the pastoral society in search of pasture and water for their livestock, as age of the household head increases, the ability to frequently move decreases which causes low productivity and exposed to harsh environment that may eventually leads to food insecure. Therefore, to overcome this effect, economic capacity building in terms of creating productive skills at local context that improve the income generating capacity of older household heads should be given more priority.

3. Results show that female-headed households are more likely to be food insecure than male headed households. Therefore, capacity building in terms of creating alternative skill development to diversify the income sources of female-headed households should be given more priority. Likewise, interventions intended to help pastoralists should effectively prioritize female headed households as a means of targeting the most vulnerable groups.

4. The study indicated that livestock holding (i.e. herd size) has a significant influence on household food insecurity. The fact that pastoralists in the district rely on livestock production as their main source of livelihood reflects the paramount importance of developing the livestock sector to help them achieve self-sufficiency in food security. Hence, necessary effort should be made to improve the production and productivity of the livestock through the provision of improved water supply points, introduction of timely and effective artificial insemination services to up-grade the genetic capability of existing breeds, launching sustainable and effective forage development program, provision of training for the livestock holders on how to improve and sustain the quality of their products with a view of increasing market competitiveness and improving the marketing conditions of livestock and livestock products. In addition to this, provision of veterinary services, protecting rangelands from invasive plant species (e.g. *prosopis juliflora*) and promoting irrigated fodder production to reduce the dependence on rain-fed feed generation are all critical steps in the process of improving production and productivity and hence reducing food insecurity.

5. Preventing the loss of productive assets due to diseases and rebuilding assets of the food secure and the food insecure households should be considered to revitalize the path of livelihood improvement through investing on critical public services in order to protect the existing household livestock resources from further depletion. Animal health services should be improved through provision of veterinary services and training of livestock herders. Adopting improved rangeland management practices should be prioritized for development interventions.

6. Social support in times of need has been found to be a strong social bond within the communities covered in the study. The social linkage remains a central core of the coping mechanisms that are employed by the pastoral communities in the study area to

support most vulnerable groups like the poor and very poor households to survive. Although this social support exists both in normal and bad years, its impact is often stronger in the latter. Assistance received through such social networks includes both financial and in-kind support and can have both regular and occasional forms. This is deeply-rooted in the pastoral tradition of the Somalis. The study suggests that this social support capital should be promoted and considered by development practitioners such as government and other actors, researchers for devising developmental direction for policy makers in relation to pastoral development in general and food insecurity reduction in particular.

7. Lastly, as result indicated, livestock and non-livestock income generating activities also play an important role to enhance self-provisioning of pastoral households. In this regard, interventions like improving capacity building through alternative skill development, improving researches on livestock development, livestock marketing and credit services as well as provision of infrastructures that enhance non-livestock activities in sustainable manner need to be designed to reduce food insecurity prevalence in the study area.

6. REFERENCES

- Abdirahman Ahmed. 2015. Food insecurity and coping strategies of Agro-Pastoral households in Babile district of Somali Regional State, Ethiopia. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University.
- Abebaw Shimeles. 2003. Dimensions and determinants of food insecurity among rural households in Dire Dawa area, Eastern Ethiopia. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University. 112p.
- Abiyot Tilahun. 2008. Challenges of livelihood diversification and coping strategies among the pastoralists in Debub Omo zone. The case of Hamar in Hamar Wereda. Unpublished MA Thesis AAU.
- Adisie Tadesse. 2016. Household food insecurity and coping mechanisms in Menz-Gera District of Amhara Regional State, Central Ethiopia. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University.
- Adugna Eneyew and Wagayehu Bekele. 2012. Determinants of livelihood strategies in Wolaita, Southern Ethiopia. *Agriculture Research and Reviews*, 1(1): 153-161.
- Adugna Eneyew. 2012. Is settling pastoralists a viable livelihood strategy? Implication for policy dialogue. *Scholarly Journal of Agricultural Science*, 2(5): 94-102.
- Africa Development Bank, 2012. Highlights of the food security situation in Africa p.1. Quarterly bulletin issue 3.
- Ahmed Mohammed Abdulla. 2015. Determinants of household food security and coping strategies: The Case of Bule-Hora District, Borana Zone, Oromia, Ethiopia. *European Journal of Food Science and Technology*, 3(3): 30-44.
- Amaza, P.S., Umeh, J.C., Helsen, J. and Adejobi, A.O.(2006). Determinants and Measurement of Food Insecurity in Nigeria: Some Empirical Policy Guide. Contributed poster prepared for presentation at the International Association of Agricultural Economics Conference, Gold Coast, Australia, August 12-18, 2006.
- Amsalu Mitiku, Bekabil Fufa and Beyene Tadesse. 2013. Empirical analysis of the determinants of rural households' food security in Southern Ethiopia: The case of Shashemene District. *Basic Research Journal of Agricultural Science and Review*, 1(6):132-138.
- Anderson, Stephen and Farmer, E. 2015. USAID Office of Food for Peace Food Security Country Framework for Ethiopia FY 2016 – FY 2020. Washington, D.C Food Economy Group, 2015.
- ANRS (Afar National Regional State), 2010. Programme of plan on adaptation to climate change. Final report. Ethiopia, Semera.

- Asenso-Okyere, K., Daniel Ayalew Mekonnen and Elias Zerfu. 2013. Determinants of food security in selected agro-pastoral communities of Somali and Oromia Regions, Ethiopia. *Journal of Food Science and Engineering*, 3: 453-47.
- ATA (Agricultural Transformation Agency). 2012. Agricultural Cooperatives Sector Development Strategy 2012-2016. Addis Ababa, Ethiopia.
- ATPS (African Technology Policy Studies Network). 2013. The rationale and capacity of pastoral community innovative adaptation to climate change in Ethiopia. Research Paper No. 25. Nairobi, Kenya. <http://www.atpsnet.org/Files/rps25.pdf>
- Ayalew, G. 2001. *Pastoralism under pressure, land alienation and pastoral transformation among the Karrayu of Eastern Ethiopia*. Maastricht: Shaker Publishing.
- Ayantoye, K., S.A. Yusuf, B.T. Omonona and J.O. Amao, 2011. Food insecurity dynamics and its correlates among rural households in South Western Nigeria. *International Journal of Agricultural Economics and Rural Development*, 4(1): 43-55.
- Ayele Solomon, Assegid Workalemahu, Jabbar M.A., Ahmed M.M. and Belachew Hurissa. 2003. Livestock marketing in Ethiopia: A review of structure, performance and development initiatives. Socio-Economics and Policy Research Working Paper 52. ILRI, Nairobi, Kenya.
- Banerjee, A., and Duflo, E. 2006. *The economic lives of the poor*. CEPR Discussion Paper 5968. C.E.P.R. Discussion Papers.
- Barrett, C.B., 2002. Food security and food assistance programs. Department of Agricultural, Resource, and Managerial Economics, Cornell University.
- Barrett, C.B., and Lentz, E.C. 2009. "Food insecurity." In *The International Studies Compendium Project*. Oxford, UK: Wiley-Blackwell Publishing.
- Basher Sheikh. 2010. Analysis of food security status and coping strategy in Kabri bayah district of Jigjiga zone of Somali Regional State. An M.Sc Thesis Presented to the School of Graduate Studies of Haramaya University. 60p
- Bawadi, H.A., Tayyem, R.F., Dwairy, A.N., and Al Akour, N. 2013. Prevalence of food insecurity among women in Northern Jordan. *Journal of Health Population and Nutrition*, (1): 49-55.
- Berhanu Gutema Balcha, 2001. Food Insecurity in Ethiopia: the Impact of Socio-political Forces. Institute for history, international. and social studies in Aalborg. Working paper no. 102. Aalborg University, Denmark.
- Birara Endalwe, Muche, M. and Samuel Tadesse. 2015. Assessment of food security situation in Ethiopia: A review. *Asain Journal of Agricultural Research*, 9(2): 55-68. DOI:10.3923/ajar.2015.55.68.

- Blench, R. 2001. Pastoralists in the new millennium. Retrieved from. Overseas Development Institute, London UK.
- BoFED (Bureau of Finance and Economic Development). 2012. Degahbour socio-economic profile. Jigjiga, Ethiopia.
- BoFED (Bureau of Finance and Economic Development). 2014. Regional Development Gap Analysis in 2014. Jigjiga, Ethiopia.
- Bouis, H. 1993. Food consumption surveys. How random are measurement errors? In: Von Braun, J., and Puetz, D. (eds.). Data needs for food policy in developing countries. International Food Policy Research Institute, Washington, D.C.
- Clay, E. 1997. Food security: A status review of The Literature, Research Report ESCOR No.R5911. London: Overseas Development Administration.
- Cochran WG. Sampling Techniques. 2nd ed. New York: John Wiley and Sons, Inc., 1963.
- CSA (Central Statistic Agency). 2015. Agricultural Sample Survey 2014/15. Statistical Bulletin 578, Volume II Report on Livestock and Livestock Characteristics (Private Peasant Holdings). Addis Ababa, Ethiopia.
- Daniel, G. 1995. Measuring food insecurity: The frequency and severity of "coping strategies". Food consumption and nutrition division discussion paper NO. 8. USA.
- Davies, M.D., Hagelberg J.N., and Ouedraogo, R. 2014. Pastoralism and the Green Economy – a natural nexus? Nairobi: IUCN and UNEP
- Debebe, H. and Tesfaye, Z. 1995. Food Security: Conceptual Framework and Situation Analysis, Addis Ababa, Ethiopia.
- Degefa Tolossa. 2002. Household seasonal food insecurity in Oromia zone, Ethiopia.
- Devereux, S. 2000. Food insecurity in Ethiopia. A discussion paper for DFID <http://www.fivims.net/documents/Final%20Paper5.pdf>
- Devereux, S. 2001. Sen's Entitlement Approach: Critiques and Counter-critiques. *Oxford Development Studies*, 29(5): 245-263.
- Devereux, S. 2006. Distinguishing Between Chronic and Transitory Food Insecurity in Emergency Needs Assessments, Institute of Development Studies, Rome Italy.
- Devereux, S. 2006. Vulnerable livelihoods in Somali Region, Ethiopia. IDS report no.57. Brighton, UK.
- Devereux, S. and Maxwell, S.(2000). Food insecurity in Sub-Saharan Africa, University of Natal press piemartzburg, South Africa.
- Diana, P.2007. Food Security in Development countries: A systematic Perspective, Medellin-Colombia.

- DPPB (Disaster Prevention and Preparedness Bureau), 2012. Somali Region Multi–Agency Gu Seasonal Assessment. Assessment Report. Jigjiga, Ethiopia.
- DPPB (Disaster Prevention and Preparedness Bureau), 2015. Somali Region Multi–Agency Gu Seasonal Assessment. Assessment Report. Jigjiga, Ethiopia.
- DPPB (Disaster Prevention and Preparedness Bureau), 2016. Somali Region dayr Seasonal need assessment. Need assessment Report. Jigjiga, Ethiopia.
- EHNRI (Ethiopian Health and Nutrition Research Institute). 1997. Food composition table for use in Ethiopia. Part III, from 1968-1997. A research project sponsored by government of Ethiopia through former ENI and EHNRI.
- Ellis, Frank. 2000. Rural livelihoods and Diversity in Developing Countries. Oxford University Press.
- Eng J. Sample size estimation: how many individuals should be studied? Radiology. 2003; 227: 309–13.
- Ermias Assefa. 2011. Severity and determinants of rural households' food security status: the case of Angolelanatera Woreda, North Shewa Zone, Amhara National Regional State, Ethiopia. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University.
- Eyasu E. 2007. Threats of Climate Change on Pastoral Production under Restricted Herd mobility: A Case Study in Borena. A study conducted for SoS Sahel.
- FAO (Food and Agriculture Organization) 2006. Food security. Policy Brief (June).
- FAO (Food and Agricultural Organisation) 2012. *Statistical Year Book*. Rome: FAO.
- FAO (Food and Agricultural Organization). 2006. Food security. Policy brief. Issue 2. <http://www.fao.org/es/esa/> [accessed to 05 2016].
- FAO (Food and Agriculture Organization). 2015. Regional overview of food insecurity: African food security prospects brighter than ever. Accra, Ghana.
- FAO (Food and Agriculture Organization). 1996. Rome Declaration on World Food Security. <http://www.fao.org/docrep/003/w3613e/w3613e00.HTM>.
- FAO (Food and Agriculture Organization). 2000. The elimination of food insecurity in the Horn of Africa: A strategy for concerted government and UN agency action .FINAL REPORT. <http://www.fao.org/docrep/003/x8406e/x8406e00.htm>.
- FAO (Food and Agriculture Organization). 2008. Review of Evidence on Drylands Pastoral Systems and Climate Change Implications and Opportunities for Mitigation and Adaptation. Land And Water Discussion Paper 8. Rome. Italy. Pp.42. www.fao.org/3/a-i1135e.pdf. Retrieved on March 2015.

- FAO (Food and Agriculture Organization). 2008. Review of evidence on drylands pastoral systems and climate change: Rome , Italy.
- FAO (Food and Agriculture Organization). 2010. Ethiopia - Country Profile: Food Security Indicators.
http://www.fao.org/fieadmin/templates/ess/documents/food_security_statistics/country_profiles/eng/Ethiopia_E.pdf.
- FAO (Food and Agriculture Organization). 2011. Drought-related food insecurity: A focus on the Horn of Africa. Rome.
- FAO (Food and Agriculture Organization). 2016. El Niño Response Plan 2016. Addis Ababa, Ethiopia.
- FAO (Food and Agriculture Organization). 2016. Situation report. Addis Ababa, Ethiopia.
- FAO World Food Summit. 1996. *The state of food insecurity in the world*. Rome.
- FAO, WFP and IFAD (Food and Agriculture Organization), world food programme, International Fund for Agricultural Development). 2015. The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. Rome.
- Fasil Gebrekiros. 2005. Enough with Famine in Ethiopia, Commercial printing enterprise, Addis Ababa.
- Fasil, F. and Mukti, P. 2007. Determinants of household supply of labor in food-for-work program in Tigray; Ethiopia. Southern Illinois University, London. Government of Ethiopia (2003). The New Coalition for Food Security in Ethiopia.
- Fassil Kebebew. 2001. Traditional coping Strategies in the Afar and Boranas Pastoralists in Response to Droughts, DCG, Report No. 17.
- FDRE (1995): Federal Democratic Republic of Ethiopia. *Food security strategy*.
- FDRE (Federal Democratic Republic of Ethiopia). 2014. Food Security Strategy. The Federal Democratic Republic of Ethiopia: Addis Ababa, Ethiopia.
- FDRE (Federal Democratic Republic of Ethiopia). 1996. Food security strategy. Prepared for the Consultative Group Meeting of December 10-12, 1996, Addis Ababa.
- FDRE (Federal Democratic Republic of Ethiopia). 2016. Humanitarian Requirement Document. Addis Ababa, Ethiopia.
- Federal Democratic Republic of Ethiopia (FDRE), 2007. *Climate Change National Adaptation Programme of Action (NAPA) of Ethiopia*, Federal Democratic Republic of Ethiopia
- FEWS (Famine Early Warning System). 2015. Ethiopia Food Security Update. Addis Ababa, Ethiopia. <http://www.fews.net>.

- FEWS NET (Famine Early Warning Systems Network). 2010. East Africa Regional Food Security Outlook October 2009 to March 2010. pp. 1-2. FEWS NET East Africa Nairobi, Kenya.
- FEWS NET (famine early warning systems network). 2016. Ethiopia food security outlook from June 2016 to January 2017.
- Foster, J., Greer, J. and E., Thorbecke. 1984. A Class of Decomposable Poverty Measures. *Econometrica*, 52(3): 761-766.
- FSIN (Food security information Network). 2017. Global report on food crisis.
- FSS (Food Security Strategy), 2002. Poverty and Poverty Policy in Ethiopia. Special Issue of Consultation Papers on Poverty No.7. Proceeding of the workshop organized by Forum for social Studies. Addis Ababa, Ethiopia, March 8, 2002, Forum for Social Studies.
- Gebbru, G., Desta, S. and Coppock, DL. (eds.). 2004. Pastoralism in Ethiopia and the Policy Environment: Linking Research, Development Actors, and Decision-Makers. Summary of Proceedings. Meeting Held 15 August, 2003, at the International Livestock Research Institute (ILRI), Addis Ababa.
- Getachew Driba. 1995. Economy at the cross road, famine and food security in rural Ethiopia: Commercial printing enterprise.
- Ghattas, H. 2014. Food security and nutrition in the context of the nutrition transition. Technical Paper. FAO, Rome. available at <http://www.fao.org/economic/ess/ess-fs/voices/en/> [accessed on August 11 2016].
- Girma Gezimu. 2012. Determinants of food insecurity among households in Addis Ababa City, Ethiopia. An M.sc Thesis Presented to the School of Graduate Studies of Aksum University.
- Grebmer, V. K., Jill, B., Waal, D., Alex, Nilam, P., Sandra, Y., Yisehac, Y. 2015. 2015 Global hunger index: Armed conflict and the challenge of hunger. Bonn, Germany; Washington, D.C. and Dublin, Ireland: FFPRI, CW, WHH <http://dx.doi.org/10.2499/9780896299641>
- Gross, R., Schoeneberger, H., Pfeifer, H., Joachim H.A. 2000. The four dimensions of food and nutrition security: definitions and concepts. FAO/EU.
- Gujarati, D. N. 2003. Basic econometrics, 4th ed. The McGraw-Hill, Inc., New York.
- Gujarati, D. N., 1995. Econometrics, 3rd ed. The McGraw-Hill, Inc., New York.
- Gulled Abdullahi. 2006. Food insecurity and coping strategies of agro-pastoral households in Awbare Woreda, Somali Region Ethiopia. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University. 63p
- Hardley, C. Borgerhoff, M. and Fitzherbert, E. 2007. Seasonal Food Insecurity and Perceived Social Support in Rural Tanzania, Norwich-UK. *Public Health Nutrition*, 10(6): 544-551.

- Hilina Mikrie. 2005. Dimensions and determinants of poverty in pastoral areas of Eastern Ethiopia: the case of Shinile zone in Somali national state. An MSc Thesis Presented to the School of Graduate Studies of Haramaya University, Haramaya.
- Hoddinot, J. 1999. Operationalizing household food security in development projects: an introduction. Technical guide#1. IFPRI Washington, D.C. U.S.A
- HRD (Humanitarian Requirements Document), 2016. Joint Government and Humanitarian Partners' Document.
- HRD (Humanitarian Requirements Document), 2016. Humanitarian response of US government the current Ethiopian drought.
- Hussein Bekele. 2006. Major Causes of Household Food Insecurity in Wuchale-Jidda Woreda, Oromiya National Regional State. MA Thesis, Addis Ababa University
- IFPRI (International Food Policy Research Institute). 2016. *2016 Global Food Policy Report*. Washington, DC: International Food Policy Research Institute.
- Ilaboya, I.R., Atikpo, E. , Omofuma, F.E, Asekhame, F.F. and Umukoro, L. 2012. Causes, Effects and Way Forward to Food Insecurity. *Iranica Journal of Energy & Environment*, 3 (2): 180-188. DOI: 10.5829/idosi.ijee.2012.03.02.1673.
- Indiris Siraje. 2012, Assessment of food insecurity, its determinants and coping mechanisms among pastoral household case of zone one Chifra district Afar National Regional State, An M.Sc Thesis of Graduate Studies of Haramaya University. 70p
- International Food Policy Research Institute (IFPRI). 2004. "*Africa's Food and Nutrition Security Situation: Where Are We and How Did We Get Here?*" By Todd Benson. Chapter 2 in *Food and Nutrition Security*. IFPRI 2020 Discussion Paper 37. Washington D.C.
- IPCC (International Partnership of Climate Change). 2007. Climate change impacts, adaptation and vulnerability. Working Group II Contribution to the Intergovernmental Panel on Climate Change. Fourth Assessment Report.
- Jef L. Leroy, Marie Ruel, Edward A. Frongillo, Jody Harris, and Terri J. Ballard. 2015. Measuring the Food Access Dimension of Food Security: A Critical Review and Mapping of Indicators. *Journal of Food and Nutrition*, 36(2) 167-195.
- JZAO (Jarar Zone Administration Office). 2013. *Annual report*. Jarar Zone Office, Degahbour.
- Kirby A, Gebiski V, Keech AC. Determining the sample size in a clinical trial. *MJA*. 2002; 177(5): 256–7.
- Kotari, C.R. 1990. Research Methodology: Methods and Techniques. Second Edition. Washwa Prakashan Pub., New Delhi, India.

- Lebeda, P. Chambers, Z., Destrée, A., Doležal, J., Marčík, I., Maritz, C., Milerová Prášková, D. 2010. Ethiopia's food insecurity: Europe's role within the broader context of food flows, Climate Change and Land Grabs. First Edition. Prague. Czech.
- Malthus, Reverend Thomas (1798) An Essay on the Principle of Population 6th ed. John Murry, London United kingdom.
- Markos Ezera. 1997. Demographic Responses to Ecological Degradation and Food insecurity: Drought Prone areas in Northern Ethiopia. Amsterdam. Thesis Publishers Ph.D. Dissertation.
- Max well, S., and Smith, M. (1992). Household Food Security: Concepts, Indicators, Measurements. A Technical Review. IFAD/UNICEF.
- Maxwell, S. 1995: *Measuring Food Insecurity: The frequency and severity of coping strategies*, International Food Policy Research Institute FCND Discussion Paper No 8, Washington
- Maxwell, S. 1996. Food Security: A post- Modern perspectives. Food Policy. Institutes of Development Studies, Working Paper No.2 vol.21. Brighton: 105.
- Maxwell, S. and M Smith. 1993. Household food security: concepts, indications, measurements. *Technical Review*, UNICEF/IFAD.
- Maxwell, S., Belache, D., and Lirenso, A. 1994. The disincentive effect of food-for –work on labor supply and agricultural intensification in Ethiopia. *Journal of Agricultural Economics* 45(3):351-359.
- Mequanent Muche. 2014. Determinants of household food security among southwest Ethiopia rural households. An M.sc Thesis Presented to the School of Graduate Studies of Jimma University.
- Mesfin Welderufael. 2012. Determinants of households vulnerability to food insecurity in ethiopia: econometric analysis of rural and urban Households. *Journal of Economics and Sustainable Development*, 5(24): 73-78.
- Mihre Jember and Tesfahun Asmamaw. 2014. Understanding food security (Module) Disaster Risk Management and Sustainable Development Department Bahir Dar University. Bahir Dar, Ethiopia.
- Ministry of Agriculture and Rural Development (MoARD), 2008. Relief interventions in pastoralist areas of Ethiopia. Addis Ababa.
- Ministry of Finance and Economic Development (MoFED) (2015). *Aid Management Platform*. Available from <http://amp.mofed.gov.et/> accessed on april 2016.
- MoARD (Ministry of Agriculture and Rural Development) 2008b. *National guidelines for livestock relief interventions in pastoralist areas of Ethiopia* Addis Ababa, Ethiopia.

- MoARD (Ministry of Agriculture and Rural Development), 2008a. Relief interventions in pastoralist areas of Ethiopia. Addis Ababa.
- MoFED (Ministry of Finance and Economic Development), 2014. Ethiopia: Growth and Transformation Plan. Annual Progress Report, Addis Ababa, Ethiopia.
- MoFED (Ministry of Finance and Economic Development). 2010. Growth and Transformation Plan 2010/11-2014/15. Volume I. Addis Ababa, Ethiopia.
- MoFED (Ministry of Finance and Economic Development). 2012. Ethiopia: Assessing Progress towards the MDGs. MDGs report, Addis Ababa, Ethiopia.
- Mohammed M. 2004. A comparative study of pastoralist parliamentary groups: case study on the pastoral affair standing committee of Ethiopia. A research report for the NRI/PENHA Research Project on Pastoralist Parliamentary Groups, funded by DFID's Livestock Production Programme and the CAPE Unit, African Union's Interafrican Bureau of Animal Resources.
- Mohammed Mussa. 2001. Poverty reduction strategy and pastoral development. Proceedings of the Second National Conference and Pastoral Development in Ethiopia. Pastoralists Forum. Addis Ababa, Ethiopia.
- Mohammed Mussa. 2004. A comparative study of pastoralist parliamentary groups. Addis Ababa, Ethiopia
- MoWR (Ministry of Water Resources). 2007. Climate Change National Adaptation Programme of Action of Ethiopia. Addis Ababa, Ethiopia.
https://www.iisd.org/pdf/2010/climate_ethiopia_communities.pdf
- Mulu Berhanu Hundera. 2010. The gendered drought coping mechanisms: the study among pastoralist communities, in Shinile District, Somali Region, Ethiopia. MA Thesis, Larenstein University of Wageningen, The Netherland.
- Napoli, M. 2010-2011. Towards food insecurity multidimensional index (FIMI). National Research Council. 2006. Food Insecurity and Hunger in the United States: An Assessment of the Measure. Https: retrieved by //www.nap.edu/read/11578/ [accessed to 20 June 2016].
- Nassef, M. Anderson, S. and Hesse, C. 2009. Pastoralism and climate change enabling adaptive capacity. HPG/ODI. London. UK.
- NDRMCC (National Disaster Risk Management Coordination Commission). 2016. 2016, Ethiopia Humanitarian Requirements Document. Addis Ababa.
- Pantuliano, S. and Wekesa, M. 2008. Improving drought response in pastoral areas of Ethiopia Somali and Afar Regions and Borena Zone of Oromiya Region. London, UK.

- Pérez-escamilla, R. and Segall-corrêa A, M. 2008. Food insecurity measurement and indicators. *Rev. Nutr., Campinas, 21(Suplemento):15s-26s, jul./ago.*
- PFE (Pastoralist Forum Ethiopia) 2008. Proceedings of the Fourth National Conference on pastoral development in Ethiopia Millennium Development Goals and Pastoral Development: Opportunities and Challenges in the new Ethiopian Millennium UN ECA Conference Hall, Addis Ababa.
- PFE (Pastoralists Forum of Ethiopia). 2010. Pastoralism and Land: Land Tenure, Administration and Use In Pastoral Areas of Ethiopia.
- Pieters, H., Guariso, A., and Vandeplas, A. 2013. Conceptual framework for the analysis of the determinants of food and nutrition security. Centre for Institutions and Economic Performance , Belgium.
- Rass, N.2006. Policies and strategies to address the vulnerability of pastoralism in Sub-Saharan Africa.Pro-Poor Livestock Policy Initiative Working Paper No.37. Rome.
- Riche, B., Hachileka, E., Auwor, C.B. and Hammill, A. (2009) Climate-related vulnerability and adaptive capacity in Ethiopia's Borana and Somali communities. London: Save the Children UK, Care International, IISD and IUCN.
- Sadik Abdi. 2012. Magnitudes and determinants of food insecurity among agro- pastoral households in Jigjiga district, Somali Regional State, Ethiopia. An MSc Thesis Presented to the School of Graduate Studies of Haramaya University, Haramaya.
- Sarracino, F. 2010. Explaining famines: A critical review of main approaches and further causal factors. Natural Resources, Agricultural and Food Security- International Research Network (NAF). International Working Paper Series. Paper n.10/02.
- Schulz KF, Grimes DA. Sample size calculations in randomized trials: mandatory and mystical. *Lancet*.2005; 365: 1348–53.
- SCUK (Save the Children United Kingdom) and DPPA (Disaster Preparedness and Prevention Bureau), 2005. *Food Security Monitoring and Early Warning Programme Report*.
- SCUK (Save the Children United Kingdom) and DPPA (Disaster Preparedness and Prevention agency), 2008. *Food Security Monitoring and Early Warning Programme Report*.
- SCUK (Save the Children United Kingdom) and DPPB (Disaster Preparedness and Prevention Bureau), 2010. *Food Security Monitoring and Early Warning Programme Report*.
- SC-UK and DPPA (Save Children United Kingdom and Disaster Prevention and Preparedness Agency). 2014. *Livelihoods and Vulnerabilities: An Understanding of Livelihoods in Somali Regional State, Ethiopia*. Updated version. Addis Ababa, Ethiopia.
- Sen, A. 1984. *Resources, values and development*. Oxford: Basil Blackwell.

- Sen, A. K. 1981. *Poverty and Famine: An Essay on Entitlements and Deprivation*, Clarendon press, Oxford.
- Skinner Djihan. 2010. *Rangeland Management for Improved Pastoralist Livelihoods*. The Borana of Southern Ethiopia.
- SLCRDB (Somali Livestock, crop and Natural Resources Development Bureau). 2011. Annual report. Jigjiga, Ethiopia.
- Smith, Lisa.C., and Subandoro, A. 2007. *Measuring Food Security Using Household Expenditure Surveys*. Food Security in Practice technical guide series. Washington, D.C.: International Food Policy Research Institute. doi: 10.2499/0896297675.
- SOS Sahel Ethiopia, 2008. *Pastoralism in Ethiopia: Its Total Economic Values and Development Challenges*.
- SRS BoFED (Somali Regional State Bureau of Finance and Economic Development). 2014. *Developmental Information and Population affairs Directorate*. GIS section, Jigjiga, Ethiopia.
- Sultan Abdurrahman. 2013. *The role of social capital on pastoral households poverty status: the case of Hammer district, South Omo Zone, Southern Nation Nationalities and People Regional State, Ethiopia*. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University.
- Tafesse Mesfin. 2001. *What should a pastoral development strategy constitute towards poverty reduction among pastoral communities in Ethiopia?" in poverty reduction strategy and pastoral development*. Proceedings of national conference on pastoral development in Ethiopia, May 22-23, 2001. Pastoralist Forum Ethiopia. Ethiopia, Addis Ababa.
- Tilaye Teklewold Deneke. 2004. *Food insecurity: extent, determinants and household coping mechanisms in Gera Keya Wereda, Amhara Region*. An M.sc Thesis Presented to the School of Graduate Studies of Addis Ababa University.
- Tilksew Getahun. 2012. *Food insecurity and its determinants among rural households: the case of Babile district, East Hararghe Zone, Oromia National Regional State, Ethiopia*. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University.
- Todaro, M. P. and Smith, S. C. 2012. *Economic development* 11th ed. Boston: Pearson.
- UNDP, 1992. *The Human Development Index- going beyond income*. [Http://www.hdrstas.undp.org/country-fact-sheet/cty-fs-ETH.htm](http://www.hdrstas.undp.org/country-fact-sheet/cty-fs-ETH.htm).
- USAID and HU (United States Agency for International Development and Haramaya University). 2013. *Emergency response situation in Ethiopian Pastoral and Agro-pastoral areas*. Prime project Assessment report. Haramaya Ethiopia.

- Wali ,H. 2012. Determinants of Rural Household Food Security in Jigjiga District of Ethiopia Kasetsart J. (Soc. Sci) 34 : 171 - 180 (2013).
- Webb P. and Rogers B. 2003. Addressing the “In” in Food Insecurity: Occasional Paper No. USAID Office of Food for Peace <http://www.eldis.org/vfile/upload/1/document/0708/DOC22027.pdf>. [Accessed to: 10 Sep 2016].
- WISP (World Initiative for Sustainable Pastoralism). 2010. Building climate change resilience for African livestock in sub-Saharan Africa: a program of IUCN - The International Union for Conservation of Nature, Eastern and Southern Africa Regional Office, Nairobi, viii + 48pp. <https://cmsdata.iucn.org/downloads/resilience2.pdf> accessed to 12 April 2016.
- World Food Summit (WFS). 1996. *Rome Declaration on World Food Security*.
- Yaro, J.A. 2004. *Combating food insecurity in Northern Ghana*. Food insecurity and rural livelihood strategies in Kajelo, Chiana, and Korania. Dr. Polit thesis, Department of Sociology and Human Geography, University of Oslo, 362, pp.
- Yemane Beruk, 2003. Food Security Situation in the Pastoral Areas of Ethiopia.
- Yenesew Sewnet. 2015. Causes and coping mechanisms of food insecurity in rural Ethiopia. *Agriculture and Biology Journal of North America*. doi:10.5251/abjna.2015.6.5.123.133. <http://www.scihub.org/ABJNA>.
- Zerihun Nigussie. 2009. Food insecurity, its determinants and rural household coping mechanisms: the case of *Mareko Woreda*, SNNPR. An M.sc Thesis Presented to the School of Graduate Studies of Haramaya University.
- Zerihun Nigussie. 2012. Levels of household food insecurity in rural areas of *Guraghe zone*, Southern Ethiopia. An M.sc Thesis Presented to the School of Graduate Studies of Bahir Dar University.

7. APPENDICES

7.1. Tables in the Appendix

Appendix table 1. Conversion Factors Used to Estimate Adult Equivalent

Age	Male	Female
<10	0.6	0.6
10 to 13	0.9	0.8
14 to 16	1	0.75
17 to 50	1	0.75
> 50	1	0.75

Source: Storck, *et al.*, 1991.

Appendix table 2. Conversion Factors Used to Estimate Tropical Livestock Unit (TLU)

Animal Category	Tropical livestock unit (TLU)
Calf	0.25
Donkey (young)	0.35
Weaned calf	0.34
Camel	1.25
Heifer	0.75
Shoat (adult)	0.13
Cow and Ox	1
Shoat (young)	0.06
Horse	1.1
Donkey (adult)	0.7
Chicken	0.013

Source: Storck, *et al.*, 1991.

Appendix table 3: Calorie value of food items conversion

Food Item	Unit	Kcal
Wheat	kg	3623
Tomato	Kg	216
Sweet Potatoes	Kg	1360
Sugar	Kg	3850
Spaghetti/Macaroni	Kg	3550
Sorghum	Kg	3805
Salt	Kg	1700
Rice	Kg	3330
Peas	Kg	3553
Onion	Kg	713
Edible oil	Lt	8964
Milk	Lt	737
Meat	Kg	1148
Maize	Kg	3751
Egg	Each	61
Coffee	kg	1103
Butter	Lt	7364
Barely	kg	3723

Source: EHNRI, (1997)

7.2. Survey Questionnaire

HARAMAYA UNIVERSITY POST GRADUATE PROGRAM DIRECTORATE

Questionnaire developed for Research entitled “**Magnitude and Determinants of Pastoral Household Food Insecurity: The case of Degahbour district of Somali Regional state, Ethiopia**”

Part One: General Information

1. Name of kebele /Pastoralist: _____
2. Household code: _____
3. Name of household head _____
4. Date of interview _____
5. Name of enumerator _____ date _____ signature _____
6. Supervisor's name _____ date _____ signature _____

Part Two: Demographic and Social Characteristics of the Household

7. Household Demographic Information

S/No.	Name of HH members	Age	Sex	Relationship to HHH	Marital Status	Education status
			01	02	03	04
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

Code 01: 0.Male 1. Female

Code 02: 1.Head 2.Wife/Husband 3.Son/daughter 4.Parent 5.Grand child 6. Brother/sister
7.Other relatives 8. Not related

Code 03: 1.Single 2.Married 3.Divorced 4. Widowed 5.Unmarried (below marriage)

Code 04: 0.Literate 1. Illiterate

8. Are there any absent household members in 2016? _____ 1.Yes 2.No

9. If yes, why are they absent? 1. Seasonal labor migration 2.Education 3. Staying with family elsewhere 4. Start Own household 5. For searching pasture 6.Others specify_____

10. Labor force status (for those whose age is between 15 years and 64): Who were participating in productive works in most of the last 12 months is how many?

Part Three: Marketing

11. Where do you buy food stuffs and non-food items (clothes and the like) for your household consumption? 1. From nearby market 2.In any villages market 3. Other (specify)

12. How far is the market place from your residence? ____Hours ____Minutes or ____ Kms.

13. Distance of the nearest market place for selling and buying your livestock?_____

Classes of livestock	Place of sale		Place of purchase(fill if different)		Remark
	Name of Market place	Distance in Km or hours	Name of Market place	Distance in Km or hours	
Camel					
Cattle					
Sheep					
Goat					
Donkey					

14. When do you sell most of your livestock? _____Months/seasons

15. Do you get reasonable prices at this particular time? _____ 1.Yes 2.No

16. If no, what are the reasons? (Multiple answers are possible) 1. Lack of access to potential markets 2. More supply of livestock 3. Lower or no demand for livestock 4. Others (specify)

17. Why did you sell at that particular time of lower (unreasonable) price? 1. To settle debts 2. To pay tax 3. Social obligations (wedding, funeral, etc.) 4. To meet family requirements 5. Others (specify) _____

18. Do you sell milk and milk by-products? _____ 1. Yes 2. No

19. If yes, which animals' milk and milk by-products you sell? (Multiple answers possible).

1. Cow 2. Camel 3. Goat 4. Sheep

20. If yes, for what purpose do you sell? _____

21. If no, what are the reasons? 1. No market access 2. Used for family consumption only

3. No market demand 4. It is a taboo 5. Other

22. Do you sell hides and skins? _____ 1. Yes 2. No

23. If no, what are the reasons?

1. No market access 2. Used for family consumption only 3. No market demand 4. It is a taboo 5. Other

Part Four: Livestock Ownership

24. Do you own livestock _____ 1. Yes 2. No

25. If yes, which classes of livestock do you own? Please, specify their type and number for the year 2016?

S/No.	Type of livestock	Owne d in 2016	Sold in 2016		Reason for sale (use the codes below)	Purchased in 2016		Remark
		No.	No.	Value(Br)		No.	Value (Birr)	
1	Oxen/bull							
2	Heifers							
3	Calves							
4	Weaned calf							
5	Cows							
6	Camel							
7	Young Shoat							
8	Adult Shoat							
9	Young							

	donkey							
10	Adult Donkey							
14	Others specify							

Code: 01 = to buy some food items for family consumption 02 = to pay a loan

03 = to buy other animal 04 = Social obligation

05 = to construct a house 06 = others, specify _____

Part Five: Pastoral Conflicts

26. Have you ever-encountered conflict with neighboring ethnic groups? ____1.Yes 2.No

27. If yes, with whom and when was you entered into conflict?

28. What was the cause for the conflict? 1. For controlling over watering points 2.For controlling over pasture lands 3. For safeguarding the clan's territory 4.For expanding the territory 5. Others specify _____

29. What was the effect of those conflicts in your life? (Multiple answers possible)

1. Loss of livestock 2. Gain /increase in livestock number 3.Loss in household assets

30. Others, specify _____

Part Six: Animal Health Situation

31. Do you get veterinary services for your animals? _____ 1.Yes 2.Sometimes 3.No

32. If no, where do you take animals when they get sick?

1. to traditional healer 2. Give medicinal plants 3.Buy vet. Drugs from where it is available 4. Take to nowhere & pray for it 5. Slaughter and eat 6. Others (specify) _____

33. If you treat with drugs, where do you get or buy veterinary drugs?

1. Veterinary clinic 2. Open markets/shops 3.Community based animal health workers (paravets) 4. Others (specify) _____

34 What services are provided by the veterinary facilities in your area?

1. Vaccination 2.Treatment 3.Both 4.Nothing

35. Have you lost livestock as a result of diseases during the year last year? Please indicate in the table below.

Classes of animals	Number died	Disease type	Remark
Camel			
Cattle			

Shoat			
Donkey			
Others			

36. What are the major killer animal diseases in your area?

37. Who is your partner for animal health care?

1. Woreda Agricultural office 2.NGOs 3.Community based animal health workers 4. No one

5.Others_____

Part Seven: Household income

38. What are the main sources of your income? 1. Sale of livestock 2.Sale of livestock products and by-products 3. Others (specify) __

39. Last year cash income from **sales of livestock**, please fill the following table:

s/no	Types of livestock	Number sold livestock	Unit price per head (Birr)	Total amount of income (Birr)
	Camel			
	Cattle			
	Oxen			
	Shoats			
	Donkey			
	Horse			
	others (specify)_____			

40. Income generated from the **sale of livestock by-products** in last year, please fill the following table

s/no	Types of livestock by-products (Items)	Unit of measurement	Unit price (birr)	Total amount of income
	Milk	Litre		
	Butter	Kg		
	Hides and skins	No		
	Manures	Kg		
	Meat	Kg		
	Wool	Kg		
	Eggs	No		
	others (specify)_____			

41. Do you or any one of your household members have other income sources (from other activities including remittances, gifts, aid and other transfers) apart from livestock in 2016?

1. Yes 2.No

42. If no, why? Because:

1. I do not have extra time for non-farm activities 4. I lack the skills required
 2. Non-farm income is less attractive 5. No starting capital
 3. There is no employment opportunity 6. Other reasons, specify_____

43. If yes complete the following table.

s/no	Types of non-farm activity (jobs) (including any remittances, Donations and Aid)	Total income received (in month)	Total annual income

Part Eight: Household social support receiving status

44. Have you received any social support from the community in the last one year in the form of any livestock? 1=Yes 2= No

45. Do you have relative who support you financially or by other means? 1. Yes 2.No.

46. If yes, for Q1, please specify the kind of social support your household received in last year by filling the following table

S/no	Types of social support your household received	Amount in Birr(If it is in kind convert to cash)	For how long(month/year)	Who supported you
	In cash			
	In kind			
	Pension			
	Inheritance			

3.Salt										
4.Pasta										
5.Macaroni										
6.Others										
E.										
Vegetables										
1.Potato										
2.Onions										
3.Pepper										
4.Garlic										

Unit example: Kg, Liter, Packet, bundle

*Finally, in your opinion, what should be done in order to improve the livelihood of the pastoralist? _____

Focus group discussion (FDG)

Session for FGD with key informants and community elders

- How do you describe your households' **food consumption your local area** and their respective production and productivity? Please consider the following terms while you are localized food consumption status of the households.
 - Food availability
 - Food Accessibility
 - Food Utilization
 - Food Stability
- How many times did you eat per day in most of the year's time?
- Describe the status of your annual livestock and land production in relation to **sufficiency** to feed your family throughout of the year. How long your own production can feed your family. What are your coping strategies?
- How do you describe your **living standards**? Better and improving, deteriorating or constant in relation to your own production changes.
- In your community how do you describe between food secure and food insecure family? Who is considered as food insecure and why? What are the criteria to be food secure or insecure in the community? How would you conduct wealth ranking of your community?

5. Is social support associated with food security status?
6. How do perceived, received, and integrative social support contribute, respectively, to households food security status? Please consider the following terms in your local area context
 - A) *Zakat* (religious alms) contributions
 - B) *Kaalmo* (in form of livestock, cash) for married couples
 - C) *Xoloo-goyan*- provision commonly owned livestock/assets to sons (specially married son)
 - D) *Irmaansi*- temporary lending of milking livestock (especially camel) to poor relatives only for milking purpose and after lactation period the livestock will be returned back.
 - E) *Xirsi*- for poor family some milk donations are given on daily basis especially camel lactating times (morning and evening time) every day. Sometimes *Xirsi* is made for guests and visitors of the family.
7. What are the major livestock diseases that are prevalence in your local area? Please list down the common type livestock diseases and rank according to prevalence by giving prevalence rank of the disease in your local area.

Thank you for your cooperation/waad ku Mahadsan tahay wada shaqeyntada